QUEENSLAND AGRICULTURAL JOURNAL

VOL. XIX. JANUARY, 1923. PART 1.

FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following Progress Report, No. 7, for the month of November, 1922, of the Entomologist stationed at Stanthorpe (Mr. Hubert Jarvis).

FRUIT FLY—POSSIBLE NATIVE SOURCE.

Visit to Vine Scrub.

On 1st November a second visit was made to the Vine Scrub, about 20 miles from Stanthorpe, and a search was made there for any native host-fruits of the Queensland fruit fly (*Chætodacus tryoni*); but no such fruits were, however, discovered here on this occasion, nor were any fruit flies seen.

One of the most remarkable features of the investigation was the great scarcity of all insect life in this scrub at this time of the year.

Native Fig.

A visit was also made early in the month to "Donneley's Castle," a rocky eminence about 8 miles from Stanthorpe, on the summit of which two or three specimens of a Native Fig-tree (species at present undetermined) are growing. Although at the time of my visit (in company with Mr. A. Hall, of The Summit, and to whom I am indebted for bringing these trees to my notice) the fruit of this fig-tree—both ripe and in a green state—was plentiful, no fruit fly maggots were found to be present.

LOCAL FRUIT FLY OCCURRENCE.

The following are the records of fruit fly occurrence within the Granite Belt during the month of November:—

On 17th November, 1922, fruit fly maggots, about half grown, were found in mid-season cherries, in the Bald Mountain District, and on the 21st additional specimens were secured—also from there. On 22nd November, fruit fly maggots, each about 4mm. long (hatched only a few days), were found at Applethorpe in two individual cherry plums.

On 24th November, four cherries were secured from the Stanthorpe area, about 2 miles from the town, harbouring fruit fly larvæ—about half grown.

On 28th November, 1922, fruit fly maggots, about 2 mm. in length, were found in Twenty Ounce apples at Bald Mountain, and about one dozen of them were collected showing fruit-fly punctures.

FRUIT FLY HABITS.

Oviposition of Fruit Fly.

It was found that, in the case of cherries, the fruit fly seldom laid more than three eggs in each individual puncture—usually two, but in some cases only one. In the Twenty Ounce apples, however, as many as eight eggs were noticed in one puncture, and seldom less than five eggs.

Number of Eggs in Captured Females of the Fruit Fly.

Twelve fruit flies captured in Twenty Ounce apples contained the following number of eggs respectively:—(1) 50, (2) 19, (3) 13, (4) none, (5) 46, (6) none, (7) none, (8) 36, (9) none, (10) none, (11) 2, (12) 44.

In one dozen fly-punctured apples of this variety, however, only four punctures were found to contain eggs. This seems to indicate the accidental disturbance of the fly, when preparing to oviposit; the sexually immature state of a certain percentage of female fruit flies at the time; or unsuitability in some particular for egg reception of the site chosen.

Development of Maggots.

Young fruit fly maggots, 1½ mm. in length, and apparently only hatched at most forty-eight hours, had, it was found, penetrated three-quarters of an inch into the apple tissue—almost to the centre. The development of the fruit fly maggot in hard unripe apples, must, however, be very slow. It is even, indeed, probable that many eggs laid in this fruit so conditioned either fail to hatch, or if hatching, the young maggots perish through inability to break down the hard fruit-tissue, and secure suitable nourishment.

Use of Lure (Experiments).

Glass fly traps baited with so-called Harvey Fruit Fly Lure (a small quantity of which was given me by Mr. A. Hall, senr., The Summit), have been set at Applethorpe, Eukey, and Bald Mountain, with the following results:—

Locality.	Date.	Time Set.	Variety of Tree.	Number of Fruit Flies Caught.
Applethorpe	28 Oct., 1922	10 a.m.—12 a.m.	Cherry ..	None
,, ..	30 Oct., 1922	4 p.m.— 5 p.m.	Cherry Plum..	None
,, ..	17 Nov., 1922	10 a.m.—12 noon	Cherry ..	None
,, ..	24 Nov., 1922	3·15 p.m.—4·30 p.m.	Cherry Plum..	One
,, ..	28 Nov., 1922	12·30 p.m.—3 p.m.	Twenty-ounce Apple	One

The fruit flies trapped both proved to be female specimens of the Queensland fruit fly (*Chætodacus tryoni*).

Laboratory Observations.

Fruit flies have been kept alive in glass jars and fed with honey and water since 8th November, 1922, and although enclosed with various fruits (*i.e.*, cherry, peach, apple, and nectarine) have failed, so far, to oviposit, but no eggs were found in the individual females flies on these being examined. Experiments are being conducted to ascertain if the Solanum fly (*Chætodacus tryoni*, var. *solani*) will, in captivity, oviposit in cultivated fruit. Solanum flies hatched 6th November, 1922, from material sent by the Entomologist in Chief, 19th October, 1922, have been confined in glass jars with various cultivated fruits procurable, but have failed, so far, to oviposit in any such fruits, although crawling over same with every appearance of interest. The Solanum fruit fly appears to be much more difficudt to keep alive in captivity than its near relation *Chætodacus tryoni*, and it requires greater care in feeding it. Female Solanum flies examined for egg-development, kept in confinement one month after hatching from the pupæ, gave negative results.

CONTROL.

Control Measures.

The fruit flies now present in various localities in the Granite Belt are, I believe, numerically few, and the setting of suitable traps *now* with a reliable lure, if discoverable, should prove helpful in controlling their increase. It must be remembered that one female fruit fly can do a great deal of damage to the fruit on a single tree,

having (as has been ascertained) from 60-70 eggs to deposit, and porbably puncturing at least twenty individual fruits. Still more important than is the use of a lure is it to collect and destroy *all* fallen fruit, and to pick from the tree any fruit seen to be fly punctured, and destroy both. Leaving stung or punctured fruit on the tree is a practice fraught with much future danger, as many maggots develop and leave the fruit, while the latter is still on the tree, more especially so in the case of the stone fruits and the softer varieties of apple. Where the cleaning up is systematically and consistently practised now, early in the season, no serious loss of fruit will, I feel sure, be experienced from fruit fly damage. As I have repeatedly emphasised in former reports, "prevention is better than cure," and no chance should be given the pest to breed: even only one or two, plums or peaches, can cause a good deal of trouble, if maggot-infested and allowed to remain under the trees.

I quite realise that this care in the collecting and destruction of all infested fruit involves a good deal of time and trouble, but it is being practised by some of our most successful growers, having each a very large area under fruit, and if it can be done by one, it can and should be done by all.

Trapping.

Trapping the fly by means of lures will, of course, be a valuable help in controlling the pest, more especially *now;* but trapping will be of little service if once the fly gets a really good start. Trapping or luring alone will, in my opinion, never constitute a practical control of the fruit fly.

Local Interest.

Being aware, as I am, of the interest being taken in the control of this serious pest, and of the determination on the part of every orchardist to fight it successfully, I feel hopeful of the result this season, knowing that every individual will willingly do all that is in his power, not only in his own interest, but also in the wider interest of the whole district, the prosperity of which depends materially on the successful control of this fruit pest. A prolific source of fruit fly infection to local orchards are (under present conditions) the numerous fruit trees situated in various private gardens in the Stanthorpe town area. Although these trees are well known to our inspectors, it is a matter of much difficulty to keep a continual watch on such trees, at this time of the year, when they are working—so to speak—at high pressure.

Close Observation Necessary.

It is, therefore, incumbent on the owners or residents on any property on which such trees are growing, to see that the trees are carefully watched, and all fallen fruit gathered and effectively dealt with. In cases where these trees are of little or no value to the owners, they should be destroyed, particularly such early fruiting trees as cherries and cherry plums. Recently two large trees of this latter species were brought to my notice by Inspector Williams, who informed me that the fruit on both was badly infested with fruit fly maggots, and this I found to be the case. I cannot too strongly emphasise the danger of such trees—if fruiting and neglected—producing, as they would under such conditions, literally thousands of fruit flies to carry on the work of destruction to later fruits. Were this fact once realised by all who own, and are responsible for such trees, I feel sure that they would, in future, do everything in their power to obviate this danger.

OTHER INJURIOUS INSECTS.

Apple Beetle (Brown Phyparida).

This little chrysomelid plant-eating beetle is, in certain orchards, doing a considerable amount of damage to both the fruit and foliage of the apple. The beetle is just over a quarter of an inch in length, stoutly built, and of a shining brown colour. It is quick to take flight, and it is not easy to capture without a net. It is easily seen, and should be fairly easily controlled with the usual codling moth lead arsenate spray.

Cutworms and Caterpillars.

Throughout the month, cutworms and other caterpillars have been destructively busy among vegetables. Specimens of the latter received from the Broadwater district as damaging tomato plants, proved to be the larvæ of the well-known Noctuid pest (*Chloridea armigera*). This pest attacks a variety of cultivated plants. Probably an effective spraying with a reliable arsenical spray, early in the growth of the plant, and followed by similar spraying at about fortnightly intervals for a couple

of months or six weeks, will be found a fairly satisfactory method of dealing with this insect. A poison bran bait recommended by the United States Department of Agriculture for cutworms (*Agrotis* spp.) is as follows:—

Wheat bran, 50 lb.; Paris green or white arsenic, 1 lb. (or powdered arsenate of lead, 2 lb.); low-grade molasses, 2 gallons. Of course any quantity can be made, provided the correct proportions are observed.

The bran and arsenic are first mixed together dry, and the molasses is then added. Under dry conditions, salt, at the rate of 5 lb. to 50 lb. of bran will keep the bait moist and render it more effective. The addition also of six finely chopped lemons or oranges to the mixture has been found advantageous in coping with certain cutworm species.

FRUIT FLY—NORTHERN NEW SOUTH WALES.

Inspection.

Visits of inspection have been made to the following places during the month:—Bald Mountain, Broadwater, Ballandean, Beverley, Sugar Loaf District, The Summit, Applethorpe, Eukey. A visit was also made to the Liston, Amosfield, and Wylie's Creek Districts, in company with the New South Wales Fruit Inspector, J. Lindsay, in order to direct him to various places where abandoned orchards, visited by the Government Entomologist of New South Wales and myself in June-July last, existed. (A report, the outcome of this visit, dated 18th December, has already been summitted.—H.T., Entomologist.)

Fungus Diseases.

Several diseases of this nature have been referred to the Government Entomologist and Plant Pathologist, Mr. H. Tryon, whose reports on the same have been in due course received.

TOBACCO CULTURE—I.*

By M. P. MARTIN, Chief Controller, Tobacco Industry, Madagascar.

Translated by MAJOR A. J. BOYD.

The latest "Bulletin Economique," published by direction of the Governor-General of Madagascar, contains a very informative article on Tobacco Culture in Madagascar and on the East Coast of Africa. Methods of cultivation and after treatment of the tobacco crop, which will interest Queensland growers, are exhaustively set out, and from this article the following interesting notes have been abstracted.—Ed.

CLASSIFICATION OF TOBACCO.

A. Heavy Tobaccos.
B. Light Tobaccos.

Heavy Tobaccos.

Heavy tobaccos are defined as tobaccos highly charged with nicotine. These can only be used in the manufacture of snuffs and in the shape of twist for chewing. In point of fact the requirements of the manufacturers are restrictive and show a tendency to become less still, as the habits of snuff-taking and tobacco-chewing are falling into disuetude in every country. Hence, the production of heavy tobaccos is not desirable. The varieties producing them should, therefore, no longer be cultivated, except, perhaps, in localities where the cultivation of light tobaccos is not possible, either on account of the azotic contents of the soil, which tends to increase, notwithstanding all the nicotine contained in the leaves, or else because the presence of chlorides renders these tobaccos completely incombustible.

Light Tobaccos.

These may be subdivided into three principal categories:—

1. *Cigar Wrappers.*—Tobacco for wrappers, that is, an external covering for cigars. The leaves intended for this purpose should present a fine resistant tissue, nerve veins scarcely perceptible, very far apart, and exhibiting a very obtuse angle

**Bulletin Economique de Madagascar.* La culture du Tabac a Madagascar (Extraits du rapport de M. le contrôleur principal Martin, des manufactures de l'Etat en mission à Madagascar).

with the centre vein. The colour must be uniform and pleasing to the eye, and the combustiblity perfect. The cultivation of this class, however, is not advisable; in fact, it would be better to advise the withdrawal of plants capable of being utilised as wrappers, as all the advantage which might be expected from them is nullified by the amount of hand labour it entails; and hand labour is expensive and almost unattainable in Madagascar, as well as in other tropical countries, such as Queensland. Failing sufficient care or suitable labour during the process of drying or in gathering the leaves, or delivery and storage, the expected returns would be far from being realised.

Small experiments should be made, which would give precious information, but stress is laid upon this:—That one should avoid, for the present at least, attempting to produce, at all events on a large scale, leaves intended for the wrapping of cigars. Once having been refused by buyers as cigar wrappers for some reason or other, such leaves would only be accepted as scraps, and the cash return would be as much less according as the leaves are of less weight.

2. *Aromatic Tobacco.*—In this category is included such tobaccos as present a well-developed and agreeable aroma, such as originated in Maryland or in the East. These tobaccos evidently command a high price, but only under the express condition that they retain the desired aroma. Seed, direct from a plantation situated in a high position, should yield from a first planting at the least plants similar in appearance to those of their parent plants, but from which the necessary qualities will have disappeared more or less entirely. The aroma, to which certain classes of tobacco owe their high price, is the result of certain things as yet uncertain. It is due to the soil and to the climate, and in all points may be compared to the bouquet of good wines. Everyone knows how, in France, the crops are catalogued and show the individual qualities which it has been found impossible ever to reproduce elsewhere. Can it be admitted the cultivation in Madagascar of the vintages of Bordeaux or Burgundy would be capable of producing such incomparable wines, or those which had been produced in their native home? It is exactly the same in the production of aromatic tobacco, and the production of the original seed with another well-authenticated seed is not a guarantee of quality. Several small experiments made in different parts of the island gave rise to a hope that well-defined localities will be in a position to produce tobaccos with a fine delicate aroma, but these must be increased before any certainty can be arrived at.

3. *Ordinary Mixed Tobacco.*—The requisite qualities of the tobaccos of this group are more restricted. To be exportable, it is sufficient that they be well cured, fairly combustible, and not possessing any disagreeable taste. According to the qualities of each lot, so will the sale price vary.

SOWING THE SEED.

A cubic centimetre of seeds weighs ½ gramme, which means 7,000 to 8,000 seeds, which is more than are required for sowing a square metre. A sewing thimble makes a good measure, and will hold sufficient seed to sow from 2 to 3 square metres of land. Too thick sowing necessitates thinning out the plants in the seed bed, which is injurious to those left to grow for planting out. When they are too crowded in the seed bed, the stems of the young plants become very thin, and the leaves are narrow and tapering, and this malformation continues after they have been planted out in their permanent positions. Furthermore, the rootlets become a tangled mass, with the result that after transplanting recovery is slow and difficult, so many young fibrous rootlets being violently broken. Too close planting will necessitate fresh planting out, and, so to speak, wet-nursing them. All this necessitates extra labour for a long period, which might have been avoided by greater care when sowing the seed.

Now, when the seed bed has been carefully and lightly sown, the young plants develop normally, they become thick in the stem, short and equal in size, and the leaves are larger. The seedlings sown with due care can be withdrawn from the bed without injuring the roots, and may be transplanted with every chance of their thriving rapidly.

To obtain on a widely-sown seed bed a uniform distance between the seeds, this can be done easily, notwithstanding the minute size of the seeds, by mixing with the latter 20 to 30 times their volume of fine charcoal cinders (ashes). Sow gently broad cast, and when there is no wind. The seed and cinders fall together to the ground, and the grey colour of the ashes enables the sower to regulate the fall of the seed. The latter, owing to their minuteness, should not be deeply sown. The best plan is to cover them with a bed of very fine earth, scattered uniformly, using for this purpose some kind of sieve. Then use a light plank laid on the bed, the

slight pressure of which causes the adhesion of the seeds to the soil, which latter should be constantly kept moist, but not too wet. All that remains to be done is to shade the bed by means of screens or bushes from the direct rays of the sun, and finally to keep down the weeds by frequent hand-weeding.

CHOICE AND PREPARATION OF THE LAND.

Although tobacco will grow on all kinds of soil, it should, in order to obtain good results, only be cultivated on soils of high fertility, which are not too moist. As a general rule, it may be admitted that heavy soils produce a coarse plant rich in nicotine, and that light soils produce a finer quality of leaf containing less alkaloids, and, consequently, of greater commercial value. A soil very rich in azote (nitrogen) increases the percentage of nicotine in the leaves, destroys their colour, and increases the difficulty of their desiccation and conservation by increasing hygrometric power. A soil rich in azote results in fine, well-coloured, very combustible, and easily prepared leaves, owing to their being less sensitive to variations of the atmosphere. Soils full of chlorides, frequently met with near the sea-coast or at the mouths of rivers, are not suitable for the cultivation of smoking tobacco, the product derived from such soils being absolutely incombustible.

In Madagascar, the difficulty of obtaining manures does not enable the grower to modify, as he would desire, the chemical composition of the soil. On the other hand, in all the districts in which the cultivation of tobacco can be advised, azote exists in sufficient quantity; indeed, it is usually found in too large a percentage. Beyond farm-yard manures, the only element to be recommended for use is potash free from chlorides, in the form of sulphate or carbonate, to the absolute exclusion of chlorides, which would destroy combustibility; hence, the ideal potassic manure is, as stated, the sulphate of potash free from chlorides.

Unfortunately, the price of potash manures is too high at present, but a substitute may be used to almost equal advantage in the shape of the ashes from many indigenous plants, which contain from 12 to 16 per cent. of potash, which should be freely scattered over the land before ploughing, with excellent results at once. With deep cultivation, the land so treated will yield infinitely greater returns than those which have only been, so to speak, scratched on the surface.

TRANSPLANTING.

As soon as the young plants in the seed beds have sufficiently developed—that is to say, when they have obtained a height of 5 or 6 inches—they will be ready for transplanting. Previously to this, the seed bed should be copiously irrigated and the water allowed to sink into the ground to facilitate the withdrawal of the seedling plants, an operation which must be carefully done in order to avoid injury to the rootlets.

The planting out must be quickly carried out, taking time, however, to select the strongest plants and as many as possible of equal size. All those which appear drawn up and slim, all spotted ones, or of pale colour, those whose root system is badly developed must be ruthlessly rejected. Plants well rooted, thick and short, with large leaves spreading over the soil and having a beautiful, uniform, deep-green colour should be the only ones transplanted, because these alone are capable of good development in the field.

The planting in their permanent places in the field is done with a planting stick or trowel, in cloudy weather if possible, or else, in the evening, and every precaution should be taken that the roots be not turned upwards or planted in a ball, and gentle pressure must be applied to ensure their adherence to the soil up to the crown. If improperly planted, the plant grows badly, becomes emaciated, and will be of little value. On the other hand, if the heart is embedded, the plant quickly dies. Watering is unnecessary, except when the soil is actually dry; in this case a single glass of water per plant is enough to ensure its striking; but directly after this watering, a slight covering of soil well crumbled should be shaken over the watered soil in order to prevent too rapid drying, which would harden the watered part and enclose the young roots in a block of compact soil highly prejudicial to the eventual development of the plant. Nothing further now remains to be done beyond providing some protection from the direct rays of the sun.

(TO BE CONCLUDED.)

SUGAR: FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, Bureau of Sugar Experiment Stations, reports under date, 13th December, 1922, as follows:—

In the course of the month of November cane areas around Bundaberg, Gin Gin, and Childers were visited.

Woongarra.

On this section of the Bundaberg sugar areas there is every chance, provided normal rains occur within the next six weeks, of a good crop. In the face of unusually dry weather during the past six months, the young plant and ratoon crop look very healthy, and, as the weather seems now very broken, a severe setback is improbable.

As previously pointed out, in reports on this district, the extraordinary hardiness and drought resistance of the young cane this year is probably due to better and deeper tillage. Growers are recommended to persist in this, especially in its relation to surface cultivation, so that the capillary soil tubes may be kept broken and moisture prevented from escaping.

Canes still making a good showing are Shahjahanpur No. 10, Q.813, H.Q.285, and 1900 Seedling. The first-named is rapidly coming into favour. This variety is 70 per cent. frost resistant, is of good sugar content, strikes, grows, and ratoons well. It is not heavy in the stick, but the number of canes to the stool make up for any deficiencies in this respect.

H.Q.285 is a variety that is going to give the farmers good returns if well selected and cultivated. It has shown no great resistance to frost, but is a good general cane, with early-maturing properties. The farmers are justified in planting this cane with any of the mid-season maturing varieties. The other canes mentioned above are well known varieties and both suitable for extensive planting on moderately good soils.

Barolin.

This area is also showing extensive fields of green cane, and prospects look brighter for a big crop than for a number of years. Very few suggestions could be made to improve cultivation. A tendency to cultivate young plant cane with implements that are inclined to propel a little too much earth on to the plants is observable.

Growers are getting good growth from the Shahjahanpur No. 10, 1900 Seedlings, Q.813, M.189, Q.970, Q.1121, and Q.1098. The three first-named are giving the best results; some very fine fields of all three varieties having been seen. The first named appears to be coming much into favour, especially on any land that is frosted or not particularly rich in plant foods.

Except for slight frost check in the winter time, the Barolin farmers should in the future make good progress. Most of the farms are easy to cultivate and drain, and present no complexity regarding feeding the soil, at least as far as can be observed by local results. Cowpea, Mauritius bean, and maize have given positive results as green manures; products of meatworks have also given payable results to the farmer. It is probable in applying lime to these soils that light applications of burnt lime with each ploughing would be better than a heavy application after each half dozen years. On this forest loam it is practically certain, from present observations, that lime would be beneficial, especially before ploughing in a crop of green maize, or in fact any green manure.

At present there is a large quantity of animal manure lying about the paddocks adjoining dairy farms. Canegrowers are reminded that this manure is good material, and the grower that avails himself of it will be amply rewarded for a little extra work involved.

Sharon.

The cane here looks well, and the growers have no need to fear a dry spell. However, the necessity to cultivate exists strongly. There is still a great deal of land in the Sharon district that would grow cane, but owing to the present unsettled state of the industry the farmers are doubtful about further development.

Gumming is in evidence in D.1135. Control of this disease has been referred to in previous reports. The most important measure is careful selection of plants, discarding of tolerant or susceptible varieties (D.1135 could be classed as tolerant), and the fallowing of land whereon the disease has been found for a period of twelve months. Farmers here are advised to give Shahjahanpur No. 10 a more extensive trial than they so far have done. Growers are also advised to experiment with sulphate of ammonia and nitrate of soda, with a view to determining their value as fertilisers calculated to force along backward ratoons.

Gin Gin.

At the time of visiting Gin Gin the country was dry, but, nevertheless, the cane looked healthy. The farms are very well tilled, and the prospects of a good crop next year are good. Grubs are doing a certain amount of damage on some farms, although the mischief done is not sufficient to cause any concern. Growers are reminded that by constant cultivation the grub is harassed and, to a certain extent, destroyed.

Good results during the past season have been obtained from M.1900 Seedling, D.1135, H.Q.426, H.Q.285, and Q.813. During future planting operations in this district it will be necessary to be most careful in plant selection, especially with D.1135, and farmers should take the opportunity of changing plants from an alluvial or granitic to a volcanic soil. Changing plants invigorates the variety and maintains it true to good type, at least it greatly helps the useful work done by careful plant selection.

Childers.

Childers presents a picture like a sea of rippling green. The great bulk of the crop next year will be ratoon, as not much planting has been done this season; there will also be a small acreage of standover.

Farmers are realising the necessity for disturbing the soil deeply, if they are to combat, in a measure, the dry season, and are strengthening their teams and adjusting their implements accordingly.

Varieties making a good showing here just at present are M.1900, Q.813, Q.1098, H.Q.285, and D.1135. The latter variety is showing a considerable amount of gum, and it would be wise if growers who are affected could spell these areas for a number of months, and reintroduce cane of the same variety, say, from the Maroochy River, where a fairly healthy set of conditions prevail.

Disease is appearing in other varieties, but there is no indication of anything that need cause misgivings. Small areas of Shahjahanpur No. 10 are in existence. This is a cane that should be more extensively planted, as it has many qualities that should recommend it to a man on low-lying ground. An idea appears to be abroad that this cane is diseased. This is entirely erroneous; the fact that it was issued by the Bundaberg Sugar Experiment Station should be sufficient proof that the cane is healthy.

Most of the growers in this district contemplate fertilising extensively in the future. As previously reminded, they should make full use of the facilities provided by the Bureau for soil analysis. Growers at present are not getting anything approaching adequate returns for the money they expend in fertilising, mainly on account of no methodical preliminary work. It is an error to be too conservative in these matters.

The Northern Field Assistant, Bureau of Sugar Experiment Stations (Mr. E. H. Osborn), reports under date, 1st December, 1922, as follows:—

Mossman District.

Generally speaking, the condition of the crops compared very favourably with any seen further South.

Up to the end of October 73.43 ins. of rain had fallen—

	Inches.
January	9.25
February	23.54
March	23.08
April	6.13
May	4.25
June	1.58
July	2.34
August	.85
September	.45
October	1.96
	73.43

Ratoons look remarkably well, and better than most ratoons seen elsewhere.

The crushing, although resulting in a lighter tonnage than previously expected, was very satisfactory. No labour troubles of any kind had caused delay to the successful working of the mill.

In previous notes mention was made that the principal canes grown in the area are:—D.1135, Black Innis, H.Q.426, Badila, B.147, and the Gorus (24A, 24, and 24B), with M.Q.1 (Mowbray Seedling). In several cases the last-named has given good results this season, both as regards tonnage per acre and also as to c.c.s. values. Mr. Arthur Rex considers that a few acres he grew on a fairly rich flat gave him a return of 35 tons to the acre, and his density returns were also very fair. After cutting the ratoons this cane grew very vigorously. This grower, after having had soil analysis made, has limed and sown with beans an area to plant later on, and compare results with other blocks not so treated.

Messrs. Crees Brothers have gone to a lot of trouble to keep their nursery up to date. They now have a very good strike of Gingor, Obo Badila, H.146, H.109, E.K.1, E.K.28, H.Q.458, Oramboo, and Nanemo. These planters deserve commendation for the care that they are always ready to give to any canes likely to be of benefit to their particular district. They are also growing a very fair quantity of B.147 upon the farm. This cane is rather a favourite in the Mossman district, as it is claimed that at thirteen months old it often gives a 30-ton to the acre crop, has a good average density, and also is a good striker. D.1135 still continues to give good results at the Mossman. Mr. J. Clarke cut a thirteen-months' old crop of 6th ratoons going 15 tons to the acre and a c.c.s. of 16.2. Badila grown alongside gave about the same tonnage per acre, but its density was only 16.0. On Mr. R. Rex's farm nearby, but upon high land (manured), a crop of 1st ratoons of this variety gave as high as 38 tons to the acre, and carried a density of 15 c.c.s. Q.813 has not so far been grown to a large extent, but an increased area has been planted out for next year. Pringle Brothers' returns from this cane are, however, worth noting, for a thirteen-months' old crop of 1st ratoons went 20 tons to the acre. The average c.c.s. of six samples of this was 15.61, against the average mill sample for the same days of about 14.5 c.c.s.

Bowen District.

The rainfall record up to 23rd November was only 24.29 inches—

	Inches.
January	5.12
February	12.94
March	2.41
April	.13
May	.11
June	.50
July	2.40
August	—
September	.25
October	.18
November (to 23rd November, 1922)	.25
	24.29

Naturally, with such a very poor fall, the cane areas (except where irrigated) looked at their worst. Luckily most of the farmers have small plots, and where these have been used the cane looks very promising. A certain amount of planting was also taking place, but in nearly all cases the land had been watered prior to planting. Also in most cases the plants had been "soaked" for a day or so.

A feature of the district was the number of new wells that have and are being sunk, and also the number of pumping plants that have been installed recently.

Mr. Burrell has a couple of wells in use, and has just ordered a tractor for cultivation work and also to pump with.

A demonstration given for pumping purposes caused him to decide upon getting a similar tractor.

Mr. J. Maltby uses a portable engine for pumping upon his farm, and claims and shows very good results from its use. This planter has had a very good strike with a number of canes lately obtained from the experimental plot upon the Home Hill State Farm. After liming with about ¾ of a ton of earth lime to the acre, watering the drills, and using about 5 cwt. meatworks manure per acre, he planted the following:—M.Q.1 (Mowbray Seedling), Tableland Badila, B.208, Hybrid No. 1, M.1900, Q.855, and E.K.28. So far, the growth is vigorous.

It is very interesting to note that many more farmers than formerly are now using manures in this area.

CALIFORNIAN METHODS OF POULTRY RAISING AND MARKETING—I.*

In view of the widespread revival of interest in the poultry industry the subjoined article reprinted from the Journal of the Ministry of Agriculture, United Kingdom, and compiled from a Consular Report, will be regarded as of exceptional relevancy.—Ed.

It is a commonplace that the conditions under which many American industries have grown up have produced organisations different in many respects from those of Europe. The difference in conditions, however, has not been so great as to preclude the adoption in Europe of American methods, where these are found to be of value. Advantage has, in fact, so frequently been taken of American experience that it is the more remarkable that poultry-farming organisation in that country has hitherto been so little reflected in British methods.

That poultry-farming practice in the United States is worthy of investigation is shown by the following salient facts:—That 22,000,000 dozen eggs and 240,000 dozen poultry were shipped in 1920 from a district in California some 50 square miles in extent; that a farm of 2,500 hens is considered to be one man's work; and that an annual net profit of 1 dollar ten cents (normally 4s. 7d.) per hen is considered a somewhat low average.

It is true that the soil and climate of California are contributory causes of these arresting results, but they are by no means so important as is frequently held. The settlement which it is proposed to describe is only one of several in California, and the methods of all of them are common to most poultry-farming centres in America, even to those in the Eastern States, where the climate is less suitable than in England. Further, the methods and devices described below must not be regarded as the chief cause of prosperity; they are themselves the outcome of a business prosperity founded on three main principles—hard work, cleanliness, and attention to detail. There are no illusions in such communities regarding the exacting nature of the work necessary for success in poultry farming, and unremitting attention is everywhere evident. The importance of cleanliness and adequate disinfection is also recognised. Dirt and disease are destructive of the results of so much labour that it has become an imperative business principle to avoid them. A continual application of these three principles has been a prime factor in creating the organisation which it is proposed shortly to outline.

This organisation has its centre at Petaluma, a town of some 6,000 inhabitants, situated near the northern extremity of San Francisco Bay. It is the headquarters of the small district which, as already stated, produced over 22,000,000 dozen eggs in 1920, and, although apparently the largest poultry-raising community in the world, may be taken as typical of many similar centres throughout the United States.

Poultry Hatcheries.

The poultry-raiser of Petaluma usually obtains his stock from one of the "Hatcheries" of which there are several in the town. One of these, which may be taken as typical, hatched out 1,000,000 chicks in 1921. The eggs are bought at about 10 cents above current prices by the hatchery, which is a business concern, and in no sense co-operative. The resultant chicks are sold at about three times the price of the original eggs. Eggs for hatching are bought from specially selected ranches known to the hatchery as possessors of highly productive strains; in some cases the hatcheries themselves supply cockerels, and are thus in very close touch with the pedigrees of the birds whose eggs they hatch. The incubators are arranged in tiers on racks in a large room and are heated by gas or electric appliances regulated by thermostats, of which there is one in each chamber. The air is kept comparatively moist by leaving the ground beneath the racks exposed, only the alleyways between being paved. This is scarcely sufficient for the upper ranges of incubators, and where necessary further moistening is provided by means of pans in the incubators. The eggs are turned by hand, the trays being grooved to make this task easy. The owners of the hatchery in question prefer this method to mechanical turning, as their experience shows that the mechanical method is productive of a considerable percentage of abnormal chicks. By the hand-turning method, combined, of course, with careful tending throughout the hatching period an average hatch of 80 good chicks in every 100 is obtained.

When the newly-hatched chicks have been dried off they are placed in ventilated boxes containing four sections of twenty-five chicks each for delivery. Frequently of course, local poultry farmers arrange to receive back the chicks hatched from eggs

* From a report drawn up by H.M. Acting Vice-Consul at San Francisco and communicated through the Department of Overseas Trade, U.K.

supplied by themselves, but large numbers of day-old chicks are sent considerable distances to the hatchery's customers. It is found possible to send day-old chicks on a seventy-two-hour journey without injury or prejudice to their subsequent growth.

An interesting feature of the organisation of the hatchery under notice is that one of the partners, who is a qualified veterinarian, is placed at the disposal of all purchasers of day-old chicks who live within a reasonable distance. If any trouble arises or if any advice is needed his services are invoked. This procedure is of great value to the hatchery, both for purposes of advertisement and because it ensures a larger percentage of survivals than would otherwise be the case. The veterinarian further justifies his existence by superintending a model poultry farm owned by the hatchery.

Brooding.

A great deal of attention is naturally given to the brooding of young chicks, and numerous types of houses and machines are in use. One of the favourite methods is by the use of what is known as the "Kresky" house. This consists of two rooms, one of which is kept heated at 75 degrees F. by means of an oil stove and thermostat, the second being considerably cooler. A small entrance is provided from the warm to the cool room, and from the latter to the chicken-run, so that the chicks may accustom themselves to the different temperatures. The room floors are usually covered with some form of warm, dry litter, and the corners are rounded off to prevent suffocation of chicks by crowding into corners.

Trays of grit are placed in both rooms, and frequently a continuous water supply and food supply is provided.

This form of house appears very useful for large numbers of chicks. The owner of a "ranch" in Petaluma recently raised 6,000 chicks in four Kresby houses each room of which could not have been more than 20 ft. by 16 ft. Including the open-air "run," these 6,000 chicks were raised in an area of less than half an acre; and, although their owner, having neglected to separate his cockerels at the earliest possible moment, was, in this case, risking loss by overcrowding, there is no doubt that chicks are brooded successfully in very confined areas. One square foot for young chicks and two square feet for hens and pullets is the room considered desirable here.

Various forms of smaller artificial brooders are in use. The majority of these are heated by oil or coal stoves. This method has the advantage of needing only one house instead of two, as with the Kresky method. An electric brooder of orthodox design was also seen, the heat being supplied by wire coils beneath the floor of the brooder. In all cases regulation is provided by a thermostat which, in the case of the electric brooder, showed a small light when current was being used.

The size of the flocks of young chicks placed in the brooders is a feature of Petaluma. The batches vary from 500 to 6,000, 2,000 being a frequent quantity. The cockerels are separated at the earliest possible moment. Success is only due to detailed personal attention to such matters as feeding, ventilation, control of light, and care that the chickens do not damage each other by toe-picking, overcrowding, and so on.

Houses.

The Chamber of Commerce of Petaluma encourages the use of trap-nests and modern hen-houses by means of egg-laying contests and kindred activities, while, as will be shown later, the methods of the co-operative egg-marketing association make it to the interest of the poultry farmer to use the most scientific methods possible. Many of the Petaluma ranches still retain the "colony" type of hen-house with a common run for several houses, but these are being supplanted, whenever possible, by more modern types of houses. The scheme now being adopted is to provide a house accommodating some 3,000 hens, the house being divided into sections each holding about 250 birds. A separate run is provided for each section, and where possible, a double run system is used, the runs either being arranged on both sides of the house or divided longitudinally on one side only.

Trap-nest systems appear generally to be confined to ranches producing eggs for hatching, and the majority of the farmers rely on their experience in judging the qualities of a hen, combined with the system known as "Hoganising" (*i.e.*, the handling test).

The houses of the poultry farm owned by the hatchery described below may be taken as typical of the principle upon which Petaluma farmers work, though in practice possibly not many of the ranches are so scientifically organised throughout.

The houses on this ranch, some 50 ft. long by 20 ft. wide, are built to accommodate 500 hens. They are lighted by muslin-covered windows and by electric light. The roosting perches run lengthways, are movable, and on one level. They are wide enough for the hen to perch without grasping with the feet, as this form of perch

is considered to be less tiring for the hen, and hence to contribute something towards its egg-laying capacity. Beneath the roost is a dropping board, some 3 ft. 6 in. from the ground and 12 in. below the perches. These arrangements leave the whole of one side and one end of the house for trap-nests, which are placed at a height of about 4 ft. from the ground, to make egg-collecting easy.

One trap-nest for every three hens is found to be sufficient, eggs being collected every hour, and credited to the record of the hen. A bucket is suspended by a wire moving in front of the nests, so that no stooping or unnecessary labour is entailed. In so exacting a business as poultry farming on this scale, such labour-saving devices are invaluable. Clean dry litter is kept on the floor and covered-in water-troughs are provided at a height of 18 in. to 2 ft. from the ground to prevent litter being scraped into the water. Feed mixtures are placed in a dry-mash hopper. It appears that the advocates of dry and wet mashes are fairly equally divided, though probably slightly more dry mash is fed on account of the saving in labour as compared with the wet mash, a dry hopper needing to be filled only once or twice per week. Where wet mashes are used they are mixed with green food to avoid wastage. Many successful farmers pay great attention to the supply of green food, care being taken to provide different varieties.

The problem of the fouling of land in Petaluma Valley is a comparatively easy one. The soil is almost everywhere a light, sandy loam, porous, and productive; the climate is mild and equable; and, the district being well provided with small hills, natural drainage is almost universal. Under these conditions the double-yard system can be used to the greatest advantage. A foul yard is ploughed up, limed, rested for a few days, and then sown with quick-sprouting seed. At the end of three weeks there is usually a growth some 6 or 7 in. high, and the hens can be turned on to this. It is thus possible to confine the birds to an area which they will completely foul in three or four weeks, and by carrying out the process described above, to keep a large flock of poultry on a very small tract of ground.

The Feeding Problem.

The dimensions of the poultry-farming industry here have resulted in simplifying the feeding problem also. There are several grain merchants established in the town who import their grain from the neighbouring Sacramento and San Joaquin Valleys by cheap water transport. They mix their feeds in Petaluma itself and by establishing carefully composed brands of uniformly good quality, have materially reduced the poultry-farmers' cares while ensuring a constant market for their goods. Most of the grain and meal seen in the repositories was of good quality and remarkably clean. It is a noteworthy result of the magnitude and intensiveness of the Californian agricultural industries—in fruit-growing and dairying as well as in poultry farming—that great importance is attached to the grading and branding of the various products. The producers themselves are so well aware of the commercial value of a good reputation for their goods that they go to considerable trouble to keep their brand uniform in quality, and are the more ready to place confidence in the branded grades of producers of other articles.

The buyer of poultry foods in Petaluma is, therefore, almost always willing to trust to a known mixture and rarely finds his trust misplaced. He is able, in consequence, to free himself from the necessity of growing or mixing grain himself.

Culling.

Another point upon which stress is laid is the elimination of the unfit or "culling." Unfit or unpromising chicks and bad layers are weeded out constantly on the principle that food is lost if given to an unworthy bird. The average bird is expected to lay 120 eggs in a year, and if she falls below this standard by the trap-nest or other record, she is sacrificed without compunction.

Co-operative Sale of Eggs.

It is after the collection of the eggs that the poultry farmer comes within the sphere of influence of the co-operative society known as the Poultry Producers of Central California Incorporated. Some 75 per cent. of the Petaluma farmers belong to this organisation, which concerns itself with the marketing of the eggs. The farmer is expected to clean the eggs if necessary with a wad of steel wool (this having been found to be by far the most effective and least injurious method) and to grade them according to their size, colour, and degrees of dirtiness. He buys egg-boxes holding thirty dozen from the co-operative society, and delivers them himself, when packed, at the society's depôt. The society's organisation makes it capable of obtaining the best and most stable price possible for eggs the receipts being credited to the farmer according to the quantity of eggs which he has delivered.

[TO BE CONCLUDED.]

PEACH CULTURE.

By J. M. WARD, Senior Instructor in Fruit Culture.

PROPAGATION.

The peach is generally grown from pits (seeds) and the variety required budded on to the seedling in January. In selecting pits, preference should be given to those from strong-growing peaches. Sometimes the hard shelled sweet almond is used as a stock; this is not generally satisfactory, except in a dry soil, the almond standing a dry situation better than the peach. When it is intended to plant on a wet soil the plum stock is used, as it will stand a more moist situation than will the peach roots. In this case the St. Julian or Myrabolan plum should be used, the former being the better of the two. Generally speaking, peaches are best worked on their own roots by budding on to the seedling; grafting is very unsatisfactory.

SOILS.

The range of soils for the peach can be somewhat extended by the choice of stock for budding upon. The best peach soils are light, deep sandy loams, more dry than most, good drainage being essential. They will thrive on land with a mixture of coarse sand and gravel, providing it contains the needed elements of fertility. For rapid growth and heavy fruiting the peach requires abundant nutriment. Therefore, where the land is of a poor nature it must be enriched by thorough manuring.

DISEASES AND REMEDIES.

The diseases that attack the peach tree are numerous: it is attacked by several forms of fungus, the most troublesome of these being curl-leaf (*Exoascus deformans*). It is also attacked by the black aphis (*Myzus cerasi*) and by the green aphis (*aphis persicæ*). For curl-leaf and other fungoids the tree should be sprayed with the Bordeaux, Burgundy, or lime-sulphur mixture just before the buds burst (about the beginning of August (using the 4.4.40 formula; spray again after the fruit has set at half strength of this mixture.

The aphis infests every part of the tree—roots, branch shoots, leaves, and young fruit—in incredible numbers, and as the whole of their nourishment is obtained by piercing the bark or leaf, inserting the beak or rostrum and sucking up the juices, it may readily be seen how very exhausting to the tree a severe attack must be. For destroying the root form of aphis, during the winter months, remove the soil a little for a few feet around the trunk of the tree, and sprinkle over the roots a few handfuls of sulphur, or pour over the roots 3 or 4 gallons of sulphate of copper (bluestone) mixture, using ½ oz. of bluestone to 1 gallon of water. If tobacco dust or leaves are procurable it can be used instead of the above; sprinkle and dig it in around the tree. To destroy the aphis on the upper portion of the limbs thoroughly spray every part with McDougall's insecticide, kerosene emulsion, or tobacco wash, such as Black Leaf 40. Continual spraying at frequent intervals is necessary, as the insect continues coming in countless numbers. It is necessary to spray with the Bordeaux or Burgundy mixture, or lime-sulphur, every spring, even if the curl-leaf does not make its appearance for one season. By continual spraying with a fungicide the tree is kept in a healthy condition, good fruit resulting.

PRUNING.

After spraying to keep fungoids down, the pruning of the peach is the most important matter to the grower. If the tree is not kept healthy pruning is useless, for the peach must be in a robust condition to make the pruning a success.

The pruning of the peach is, like that of the plum, greatly misunderstood by the majority of fruitgrowers, resulting in small crops of fruit being picked from the tree, and what few fruit there are are mostly gathered from the top of the tree or the ends of the branches, most of the wood being almost destitute of leaves and fruiting laterals. The fruit of the peach tree only comes on one-year-old wood; occasionally some varieties fruit on spurs, but this only rarely takes place. One must rely only on one-year-old laterals for his crop, otherwise he will be sadly disappointed. It is the common practice among those who have not studied the habits of the peach to let it grow entirely unpruned; this results in heavy crops while there is young wood in the tree. The new growth will fruit, then become barren, the peaches again appearing on the new wood that has extended from the place

where the fruit was previously gathered. Each year the new growth is weaker and shorter, and gradually the lower portion of the tree becomes devoid of fruit and is of little value, except for acting as a channel to convey a supply of sap to the upper portion of the tree, where the foliage is most dense, and where—when the tree is in such condition—it is most needed. This is not the state in which a peach tree should be. The young growth should be evenly distributed over the whole tree, especially over the lower portions. To obtain the desired effects the tree must be given proper and skilful treatment from its earliest inception, and trained in such a manner that the main arms are well placed and strong, so as to be able to stand the strain of heavy crops without breaking. To have a tree in this state one must start with the yearling tree as received from the nursery; it is either one that has been pinched back in early summer and has developed three or four good leaders or one that has grown straight up and has several short laterals. To start the latter in the way it should be trained, choose the strongest laterals at a distance of about 15 inches from the surface of the soil, then cut the remainder of the tree away at the base of the foremost of these, reducing the three laterals to about three buds; these become the main arms of the future tree. The one which has been pinched back in the nursery already has the main arms or leaders formed, and these should also be cut back to three or four buds. From these the following year may appear several strong leaders; at the next winter pruning the strongest and best-placed of these are cut back to about 12 in. or 15 in. Those not required for main arms can be entirely dispensed with. By this time one should have a tree with a good foundation, the summer following this should show a strong-growing, densely-foliaged tree, which will require a light thinning out of the centre—this should be done during January. Up to this time no provision has been made for fruit, but this can be done at the next winter pruning, which is the third from time of planting. At this period (winter pruning) one must use good judgment, as there are several strong growths, all of which would make good leaders. Decide which of these are best placed and will make the best leaders, then cut them back to from 12 in. to 30 in. according to growth; the remainder of the strong shoots can be entirely dispensed with, retaining the shorter and weaker ones which are termed laterals. Some growers are in the habit of shortening these back; the writer does not favour this; for after a lengthy experience in growing peaches for profit, I find that it is better to leave these laterals the full length. I have experimented on several different systems for a number of years, and now only practise one, which I find to be simple and most profitable, and will also keep the tree growing in a vigorous condition. But one must not shorten laterals, for if this is done the best fruit buds are cut away and invariably the buds left are weak, and the blossoms often drop off, and what promised to be a good crop diminishes to a small one. The system advocated for treating the laterals after the tree is well shaped and old and strong enough to bear fruit is to retain all the short, well-matured ones, and cut away the stronger ones, of course always making provision for the leaders. Those that are retained will bear fruit the following summer; after fruiting they will become barren for all time, the terminal bud growing for a few inches, sometimes a foot or more. After the laterals have fruited they must be cut hard back at the base; others have appeared from the place or thereabouts where the stronger ones were cut back the previous winter. The majority of this new wood is left to carry the following season's crop. Where you cut away that which has fruited provision is made for a further supply of new wood for aonther crop the following year. Always dispense with the wood that has fruited; never leave two-year-old laterals in the tree. Let the one-year-old laterals fruit; while these are fruiting others are growing to replace those that have been cut away, and in turn these are disposed of and others again take their place. Given this treatment, the peach will bear heavy crops every year, not only on the top of the tree, but at the bottom also. The leaders should always be cut hard back, say six to eight buds, so as to give them strength; also have them well and evenly spaced. Sometimes they require to be cut back to an inner bud, so as to prevent them being too low or too horizontal, and getting in the way of the plough and cultivator. Occasionally it is a wise plan to cut strong growing laterals about half way back so that more laterals will shoot out.

RENOVATING OLD TREES.

There are many very old peach trees in orchards that are bearing very small crops. In most cases such trees are in good heart and only require skilful treatment to bring about a return of good crops. The writer has pruned many such trees during last winter, and in visiting them again lately found that they, as was expected, have responded splendidly to the treatment given. They are full of new wood, which augurs well for next season's crop, to the great delight of the various owners. There are two ways of bringing an old tree back to a young state again. One is to cut them down to within a few feet of the ground, and depend upon the dormant

buds breaking out and sending forth new growth, and building a new tree up. This method I do not advocate, for unless the roots be very healthy the stump will often die. The second method is to saw any branches that are growing in the centre of the tree away, also those that are too low down, and those that are most exhausted. also dead wood. Do not be afraid of cutting too many limbs out, and do not leave any short stumps, as they invariably die back; cut all limbs close back and trim the edges off with a sharp knife, and paint over. After disposing of these limbs, shorten the remainder back a foot or two. The summer following on this pruning there will be furnished over the whole of the tree a supply of new wood, which may surprise the pruner. During the next winter pruning some of this new growth may be wanted to take the place of some of the old leaders; if so, choose those best suited for the purpose. Of the other young growth, half of it should be dispensed with, retaining the remainder to carry a crop the following summer; this in turn is cut away during the next winter pruning, again leaving more new laterals to carry another crop. Repeat this treatment of new wood each year. In addition to cutting away some of the larger limbs smaller ones can be removed the following year. After about two or three years of this treatment you will have practically a new tree in place of the old one.

THE BANANA BEETLE BORER.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report by Mr. Froggatt, the Entomologist who is especially engaged in investigating the Banana Beetle disease.

With all insect pests that have not had sufficient notice taken of them in their initial stages, and which the apathy of those vitally concerned has allowed to increase until they become a decided menace, there is no simple means for a cure. It is only by steady and persistent work in gradually reducing the numbers of the pest that it can first of all be checked, and then by further efforts, consistently sustained, that it can be reduced to a negligible quantity if not completely overcome.

The Banana Beetle Borer, a case in point, differs so markedly in its habits from the general run of orchard pests that the common means of control, such as spraying, &c., are absolutely of no avail. Throughout the whole life-cycle, the insect does not come on to the surface, and the adult beetle does not leave the plant until it is mature.

Under ordinary conditions, there are no openings into the heart of the corm through which the grubs can be reached, and even where beetles have eaten their way out, the old tunnels are so closely packed with the sawdust-like excreta, that the result is virtually the same.

Methods for attacking it are, therefore, limited for the present at any rate, to the adult stage. As the beetles are scattered in the soil, principally in and around the stools and amongst rubbish in between the rows, means of gathering them together as far as possible in one spot in order that they may be more readily collected and destroyed have first to be considered. The most satisfactory method so far found is to lay pieces of clean corm or the base of stems cut surface downwards on the bare ground in or just outside infested stools, or where infested corms or stems are found lying on the ground. The beetles collect on the under-surface of these baits, and by turning them over early in the morning the beetles can be collected and destroyed either by burning, crushing, or other suitable means to hand.

And then arises the greater question, how to reduce the numbers breeding? This is wholly a question of keeping the plantation free from superfluous banana plant material in such a state that the grubs can reach full development therein. Infested plants and bulbs must be dug out and the corms cut into small pieces and the stems cut in halves lengthways; any old corms or stems lying on the ground should be treated in a similar manner. It is preferable to burn this material wherever possible.

It is of little, if any, value to carry out these measures for a time, and then cease from labour thinking the pest is wiped out. Many, acting under this misapprehension, have found to their cost that the beetle borer is an enemy which must not be underrated. Those who realise this fact, and are ready to work against this menace along the lines indicated, will soon reap the beneficial results of their labours.

By further experimentation the work entailed in combating this insect may be greatly simplified, but the tests are not yet sufficiently far advanced to enable conclusions to be drawn from them.

CANE PEST COMBAT AND CONTROL.

The Entomologist to the Bureau of Sugar Experiment Stations, at Meringa, Mr. E. Jarvis, reports under date, 13th December, 1922, as follows:—

Effect of Dry Weather on Cane-Beetles.

In my October report it was mentioned that excavations made in canefields at Highleigh and Meringa had revealed the presence of grey-back beetles in the pupal chambers. It may be stated that the date of these investigations, which was inadvertently given as 10th September, should be corrected to read 10th October.

Upon looking up weather statistics, in relation to rainfall, it appears that the present drought conditions are very similar to those experienced in this district during 1915, when the precipitation for the months of August to November was only 1.74 inches.

Beetles during that year assumed the adult form about the middle of September, and, in spite of abnormal dryness of the soil, were subsequently found alive in their pupal chambers at the end of October.

A month later, however (28th November, 1915), plenty of dead grey-backs were ploughed up on volcanic soil, no living ones being observed. The depth of cultivation on this occasion was 1 ft., in ground fairly loose and very dry.

It appears, therefore, that in certain soils adults of this species are unable to remain alive underground in dry weather longer than from nine to ten weeks. From June to August, while grubs of these beetles were pupating, 5.30 in. of rain were registered, as against 7.19 in. for the same months during 1922. It is interesting to find that since the beginning of September last to date (28th November), we have recorded only 1.79 in. at Meringa (5 points more than fell during the same period in 1915).

In the event of the present dry conditions continuing for another week or so, multitudes of grey-backs that assumed the imago state about seven weeks ago are likely to die in the soil; while others, arising from grubs that pupated later in the year, will be so weakened by protracted confinement underground that if able finally to emerge from the soil next month (December) they may succumb prematurely before able to lay eggs.

In 1915, for instance, beetles that managed to reach the surface when the drought broke in December could not withstand a slight heat wave lasting a couple of days—when the maximum shade temperature ranged from 95 deg. to 98 deg. F.—but simply fell dead in thousands from the feeding-trees. No less than ninety-eight specimens were picked up on an area of about 2 square chains, and twenty-five from under a single gum-tree of moderate size.

The occurrence of such heavy mortality was of exceptional economic interest from the fact of its having happened about seven days after emergence of these beetles, and consequently before they had had time to oviposit. Several were dissected, and the ovaries in all examined were not fully developed, while in some specimens the eggs were half grown.

Breeding Tachinid Fly-Parasites.

During the past month we have built an additional large insect-cage for breeding specimens of *Ceromasia sphenophori*, the tachinid parasite of our beetle borer of cane. This new cage (see accompanying photo.) has a floor area of 56 square feet, and is 7 feet 6 inches high (internal measurements). It is constructed of hardwood, the sides being of mosquito-netting and the roof and hood of strong calico.

Provision has been made for the establishment of conditions resembling as nearly as possible those obtaining in the field, for excluding insect enemies of the fly, and combating entomogenous fungi. Further liberation of parasites has been made this month at Gordonvale, Mount Sophia, and Aloomba.

At the present time, being near the end of the cutting season, it is not easy to procure bored sticks from which to obtain grubs for carrying on our breeding of this useful insect. Growers having any standover cane affected by borer-grubs, and who may be willing to help us in this work, are asked to communicate with the writer. Tachinid flies will be liberated free of charge on plantations seriously affected by the beetle borer (*Rhabdocnemis obscurus*, Boisd.) on condition that the owner will agree to leave at least half an acre of badly-bored, unburnt cane for the parasites to breed in.

Scarcity of Grubs.

The 1922-23 season will see the appearance during next month (December) of vast numbers of a small brown cane-beetle (*Lepidiota frenchi* Blackb.) which fortunately has a two years' life-cycle, and, although emerging each season, occurs in greatest numbers every second year. The third-stage larvæ of *frenchi* are generally destructive to cane from August to November—at a time when grey-back beetles are either underground in the pupal or imago forms, or have oviposited and produced first-stage grubs, which, however, have not commenced to seriously injure the roots.

Both these beetles lay their eggs during December or January, the grubs of *albohirtum* attaining full size in a period of about six months, whereas those of *frenchi*, which mature very slowly, remain in the larval conditions fully a year longer; thus accounting for occurrence in the same furrow, so often noticed by growers, of large and comparatively small grubs. Fully-grown grubs of the latter insect are

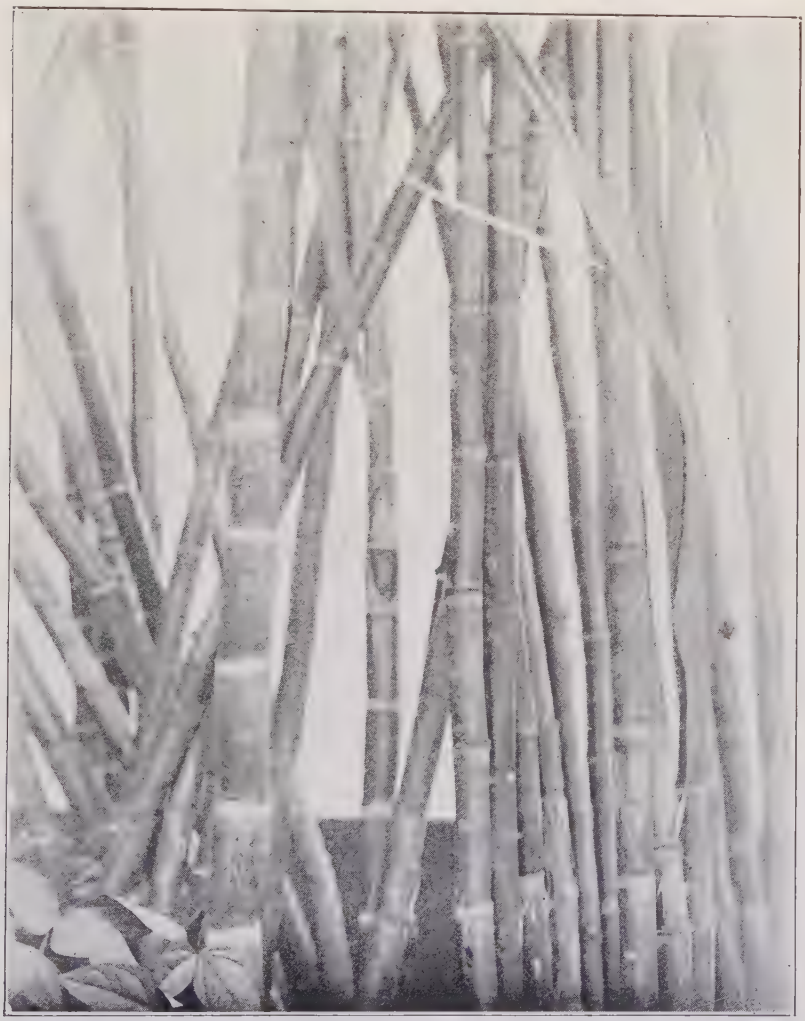


PLATE 1.—INTERNAL VIEW OF CORNER OF CAGE FOR BREEDING TACHINID FLIES.

Showing growing cane sticks stocked with Borer grubs ready for the flies to parasitise. Note the holes in middle of internodes, made when inserting the grubs, and plugged with fibre obtained from cocoons of the beetle-borer. Each stick contains 10 to 15 grubs, and is able, under favourable conditions, to produce about 50 tachinid parasites.

usually mistaken for those of *albohirtum*, which they closely resemble in size and general appearance. As mentioned in a previous report ("Australian Sugar Journal," Vol. VIII., p. 917) *frenchi*, although feeding habitually on roots of cereals and various herbaceous plants, has acquired a decided liking for cane. Although one of our serious cane-beetles, being second perhaps to *albohirtum* in economic importance, this insect oviposits as a rule in uncultivated soil densely covered by grass, weeds, &c. This being the case, it behoves growers, as I have advised in a previous report, to maintain during December and January a system of clean culture on areas devoted to cane, and more particularly on fallow land that may be reserved for the planting of an early crop. Both *Lepidoderma albohirtum* and *Lepidiota frenchi*, which usually lay their eggs during these months, are strongly attracted by a luxuriant growth of vegetation between the rows, so that land left in this condition runs a risk of becoming badly infested.

At the present time, cane-grubs are not easy to procure, owing to the prolonged spell of dry weather, so that experimentation against this stage of our grey-back cockchafer has been discontinued for the time being. Very few insects affecting cane have appeared so far, although odd specimens of three or four species of cane-beetles are to be noticed occasionally on the wing during nightfall.

Large Moth-Borer of Sugar-Cane.

This moth pest (*Phragmatiphila truncata*, Walk.) is usually in evidence throughout November and December, at which time of year it attacks principally shoots of young ratoon and plant cane from 9 to 24 inches in height. Attempts to procure additional specimens of its parasite (*Apanteles nonagriæ*, Oliff.), the economic value of which was alluded to in last month's report, have not yet proved successful; but, as it is usually the later broods of *truncata* that are most freely parasitised, we shall probably breed these tiny wasp-parasites from borer caterpillars collected during December. On the 6th instant, fifty-eight ratoons with 'dead hearts' were collected by Mr. H. Knust, at Banna, which when examined yielded forty caterpillars of this moth-borer, the tunnels of the remaining eighteen shoots being empty. These larvæ pupated in due course, and moths commenced to emerge in the breeding-cages about the 18th instant.

Notes on Para-Dichlorobenzene.

We are hoping that the price of this fumigant in England or America may prove to be less than that quoted from Germany.

During field experiments, however, it will be possible to test various methods of application in order to determine the minimum amount of *P. dichlorobenzene* needed per acre to destroy from 80 to 100 per cent. of the grubs. Doses of one drachm placed a foot apart should prove effective if injected in time to catch the first stage larvæ; and this would cost about £4 per acre. By placing these doses 18 inches apart the expense could be still further reduced.

In the event of our being able to purchase the fumigant for 9d. per lb. we reduce the above figures by one-half, and could then well afford to give one-drachm injections a foot apart at a cost of £2.

THE QUEENSLAND COTTON INDUSTRY.

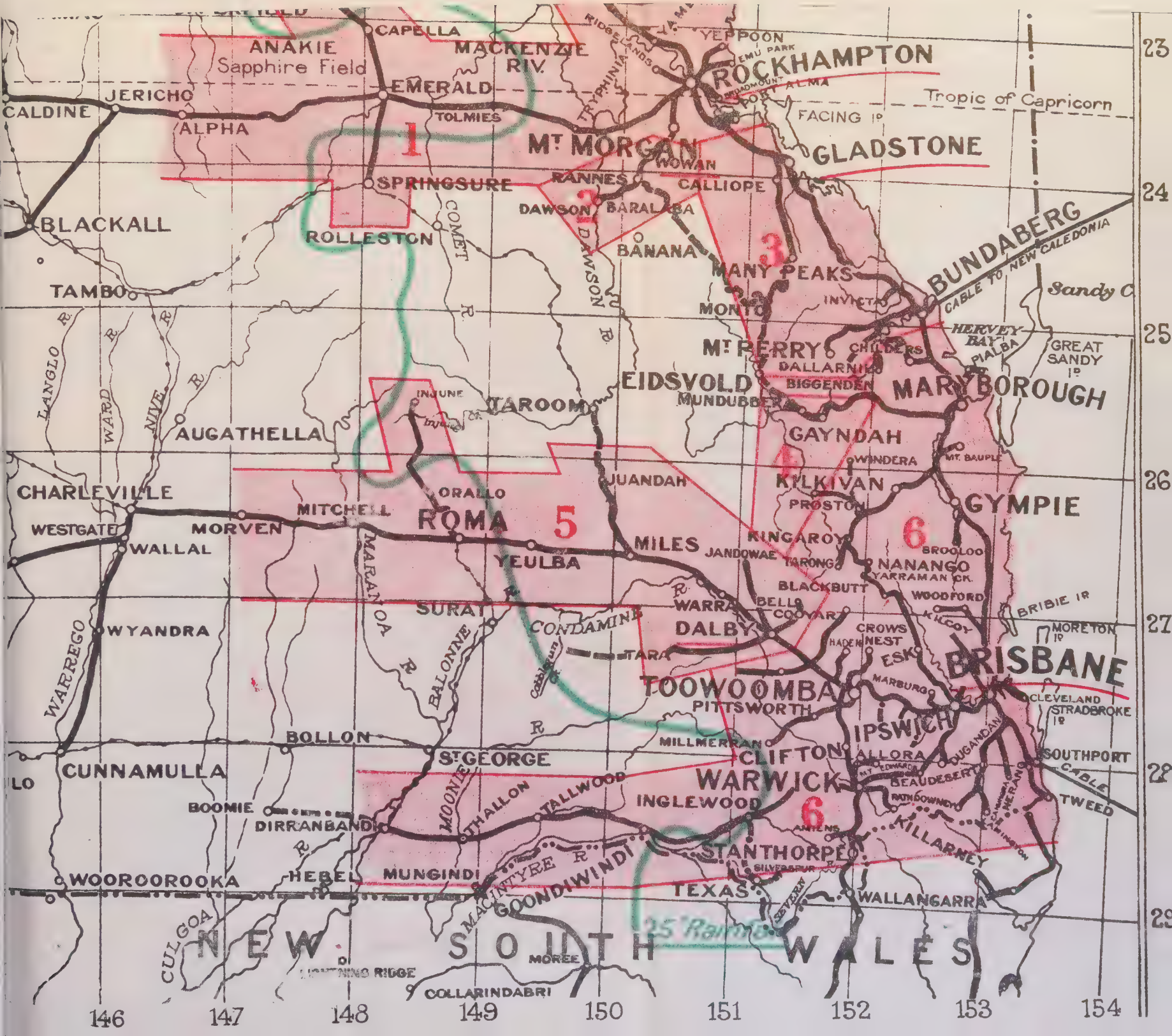
REVIEW AND PROPHECY.

Subjoined are summaries of important interviews accorded to an influential Southern paper on the subject of Queensland's cotton industry by His Excellency the Governor (the Right Hon. Sir Matthew Nathan) and the Premier (Hon. E. G. Theodore) and which are of especial interest to cotton-growers.

Cotton-growing as a Queensland Industry.

His Excellency Sir Matthew Nathan in the course of a Press interview expressed a thorough belief in cotton-growing as a Queensland industry, and remarked—

"It seems that the conditions of the soil and climate are such that we can grow here the best sort of cotton. Under existing conditions in Australia, it is only with such an article that we can count on permanently competing with other producing areas. There will always be a market for the produce of the highest quality, even though much more has to be paid for it than for a lower quality. I should view with little satisfaction any great extension of cotton-growing in Queensland if an inferior article were produced, even if it were to be for home consumption, as this would be


ANAKIE
Sapphire Field
CAPELLA
MACKENZIE RIV.
EMERALD
JERICHO
CALDINE
ALPHA
TOLMIES
YEPPOON
EMU PARK
ROCKHAMPTON
BROADMOUNT
PORT ALMA
Tropic of Capricorn
FACING I.
GLADSTONE
Mt MORGAN
WOWAN
RANNES
CALLIOPE
SPRINGSURE
DAWSON
BARALABA
BLACKALL
ROLLESTON
COMET R.
DAWSON R.
BANANA
MANY PEAKS
BUNDABERG
CABLE TO NEW CALEDONIA
Sandy C
TAMBO
MONTO
INVICTA
HERVEY BAY
PIALBA
GREAT SANDY I.
Mt PERRY
CHILDERS
DALLARNIL
EIDSVOLD
BIGGENDEN
MARYBOROUGH
MUNDUBBERA
INJUNE
TAROOM
LANGLO R.
WARD R.
NIVE R.
AUGATHELLA
GAYNDAH
WINDERA
MT. BAUPLE
JUANDAH
KILKIVAN
CHARLEVILLE
ORALLO
MITCHELL
ROMA
PROSTON
GYMPIE
WESTGATE
MORVEN
WALLAL
MILES
KINGAROY
JANDOWAE
TARONG
NANANGO
YARRAMAN CK.
BROOLOO
YEULBA
MARANOA R.
BLACKBUTT
WOODFORD
BRIBIE I.
SURAT
WARRA
BELLS
COOYAR
KILCOY
MORETON I.
WYANDRA
CONDAMINE R.
DALBY
CROWS NEST
HADEN
ESK
TARA
BRISBANE
WARREGO R.
BALONNE R.
TOOWOOMBA
MARBURG
CLEVELAND
STRADBROKE I.
PITTSWORTH
IPSWICH
BOLLON
MILLMERRAN
CLIFTON
ALLORA
DUGANDAN
SOUTHPORT
St GEORGE
CUNNAMULLA
WARWICK
BEAUDESERT
CABLE
TWEED
MOONIE R.
THALLON
TALLWOOD
INGLEWOOD
BOOMIE
DIRRANBANDI
ANTENS
KILLARNEY
STANTHORPE
SILVERSPUR
MACINTYRE R.
WOOROOROOKA
HEBEL
MUNGINDI
GOONDIWINDI
TEXAS
WALLANGARRA
CULGOA R.
NEW SOUTH WALES
MOREE
LIGHTNING RIDGE
COLLARINDABRI
25 Rainfall
146
147
148
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QUEENSLAND.

COTTON ACREAGE—
SEASON 1922-23.

Reference—

Railways shewn thus ..

District ,, ,, .. 1

Rainfall ,, ,, .. 25"

DISTRICTS.	SEASON— 1921-22. Yield lbs. Seed Cotton.	SEASON— 1922-23. Seed Distributed Acres.
1. Rockhampton ..	800,000	25,213
2. Wowan	1,500,000	17,780
3. Gladstone	80,000	8,080
4. Biggenden	350,000	27,858
5. Dalby	296,000	27,529
6. Brisbane	800,000	22,489
North Queensland ..		2,211
TOTAL	3,826,000 from 5,000 acres.	131,160 A.

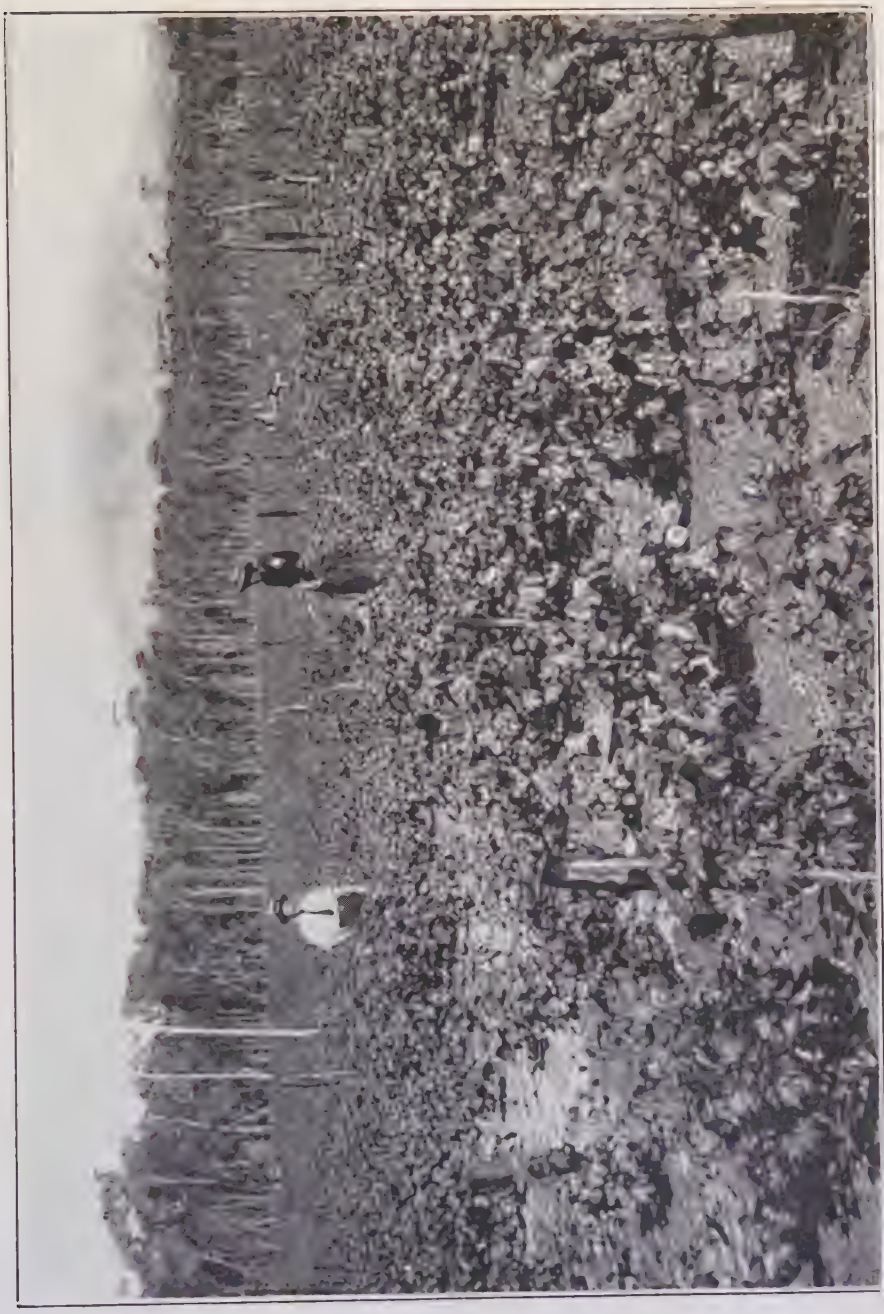


PLATE 2.—COTTON PLANTATION ON VIRGIN LAND, DAWSON VALLEY, CENTRAL QUEENSLAND.

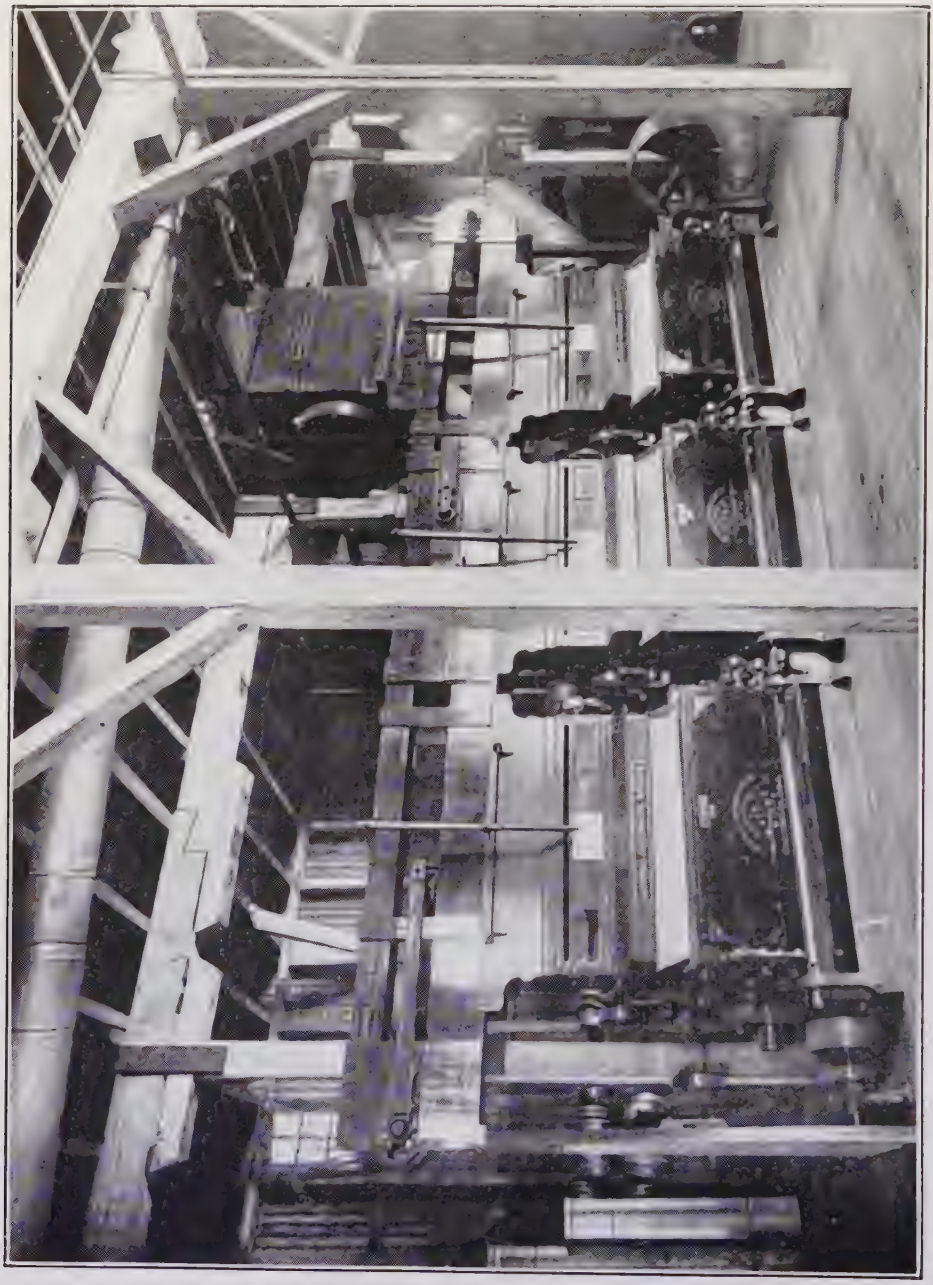


PLATE 3.—COTTON GINNERY (INTERIOR), ROCKHAMPTON.

bound to lead to a deterioration in the cotton for export, and so to the loss of any remunerative export trade. To produce the best cotton it will, of course, be necessary to have, in addition to our favourable natural conditions, the best seed, planted in the best way, and the best cultivation.''

Sound Farming Practice Necessary.

''Ultimate success depends on the farmers and they will have to realise that it is much wiser to cultivate a small area well than a larger one indifferently. Some of the cotton lands I saw last May were badly cultivated, owing, as I was told, to the farmers' haste to realise a big return in the season. In this direction lies disease, which may well spread from the ill-cultivated to the well-cultivated cotton farm at Wowan, as it has gone from the neglected to the cared-for orchard at Stanthorpe. I do not imagine, however, that the best cultivation is an absolute specific against disease in these lands so favourable to all forms of life, noxious as well as beneficent.''

PLATE 4.—COTTON PICKING, DAWSON VALLEY, CENTRAL QUEENSLAND.

An Element of Mixed Farming.

''The possibility of disease is one of the reasons why I do not believe in the entire dependence of any farmer on cotton. Another is the possibility of fall in price. There will not always be a guarantee, and though I believe, as I have said, that there will be a permanent paying market for the best cotton, it will be necessary for farmers to have some other standby.

''Some farmers came to grow cotton in corresponding circumstances of temporary depreciation in dairying. Wowan dairy-farmers would have gone under if cotton had not saved them. I can quite conceive dairy produce doing a similar service to cotton-growers in the future.

''For these reasons I believe in cotton-growing as an element of mixed farming in combination with dairying, sheepraising, possible wheatgrowing, rather than in exclusive plantations.''

The Picking Problem.

"Another reason for small plot cultivation is the labour required for picking. I am doubtful if it would be to the advantage of the State that another great industry in it should become dependent on a large body of seasonal labour, which would have to be paid in inverse proportion to the shortness of the period for which it would be required. Indeed, it seems possible that payment with this consideration in view might make the industry impossible. But the employment of seasonal labour cannot be avoided in the cultivation of larger areas than can be picked by the farmer himself, and those permanently associated with him on the farm. These areas can easily be calculated on the basis of the labour available for the period of picking, of the estimated aggregate picking capacity of the individuals composing it, of the estimated production per acre, and of the time during which picking can be carried on.

"I think it may be taken that a single adult can pick about 5 acres in the season, and that from such an area he should clear, under the present guarantee, about £100 a year. Taking families and the comparatively few cases of labour permanently employed on the farm into consideration, we may hope to see a great number of farms from 5 to 30 acres in area. I have heard that 75 per cent. of the cotton catered for by the Rockhampton ginnery will come this year from farms where outside labour will not be employed for picking. I shall be glad if this percentage is general through the country, and increases.

"I believe that a very large number of farmers growing, as part of their scheme of mixed farming, cotton of the best quality, cultivated in the best manner on such areas as can be picked without the engagement of temporary labour will bring great wealth to Queensland and some of the population it so urgently requires."

The Commonwealth Cotton State.

Points from Hon. E. G. Theodore's remarks in the same journal—

Queensland, with its vast area of fertile land, equable climate, decentralisation of population, extensive and rapidly-extending transport systems and other outstanding advantages, both natural and developed, must become inevitably one of the greatest producing States of the Imperial Group. In building up that prosperity, cotton-growing opens out a vista going far beyond sight.

Unrivalled natural wealth yet latent will place Queensland in a premier position as the Commonwealth Cotton State. Already on much cheaper lands we have grown staples equal to those of any other cotton country in the world. These lands are generally high-class agricultural and fruitgrowing areas, but uncertainty of remunerative markets for ordinary produce has hitherto kept them out of use; for cotton, however, the market is practically unlimited.

Last year in Queensland 1,800 farmers aggregated a side-line crop of cotton worth £90,000 off about 7,000 acres. This year seed has been distributed to 10,361 settlers to sow 129,211 acres. Next year, we expect to have 250,000 acres under crop, but there is nothing to prevent the area being increased until, within a few years, it reaches 5,000,000 acres. There is that area of Crown lands suitable in every way for cotton and served by existing railways and ports, and which can be made available by the Government if it is demonstrated that the crop is payable and permanent.

Successful settlement on cotton areas will be the most effective means of fillling Queensland's vacant spaces. For every 1,000 settlers there are work and subsistence for 10,000 men, women, and children; so if our anticipations are realised there may be eventually a population of 1,000,000 people dependent upon this great prospective industry alone.

That is the very best kind of immigration scheme that can be devised. With land available on which the new settler can be assured of a marketable and profitable crop there will naturally follow such an influx of people to Queensland that artificial schemes will be superfluous.

The cotton industry does not involve drudgery on farmers and their families. It is a pleasant, desirable, healthy occupation, and will lead to making agriculture more popular as well as profitable.

Provided suitable seed is sown and kept pure, no reason can be advanced against Queensland cotton prospects that would not apply with equal force to other cotton-producing countries.

Any intention to grow cotton must be backed by an intention to grow the best.

Quality of product must be sustained at a high level and the Queensland Government is doing everything possible to produce and supply to growers high-grade seed of suitable types. This side of the cotton business calls for sound organisation, high intelligence, and the keen co-operation of growers.

Intensive rather than extensive cultivation is desirable, but where conditions fit, larger fields will surely prove an economical proposition.

Continuity of seed selection will standardise crops, and continuity of quality will stabilise values.

Under existing conditions cotton-growing is more suitable as a sideline in diversified farming than as a sole source of income.

Among the essentials of success are right choice and preparation of soil, seed selection, careful cultivation and restriction of areas to an acreage that can be conveniently and profitably worked.

The Queensland cotton industry will also benefit by the State-wide system of rural organisation now proceeding vigorously along well-defined, scientific lines. The days of amiable aspiration and pious platitude in relation to the agricultural industry in Queensland are gone. Farmers have asked for facilities to exercise their right to the recognition of their calling as a business enterprise, and claim the same consideration extended to other branches of commerce, and the Government is standing by them.

PLATE 5.—A FLEECY FLAKE FROM COTTON LAND.

Photo. by R. Harding.]

PLATE 6.—IN QUEENSLAND COTTON COUNTRY—Members of the British Cotton Delegation at Gordon Downs, Capella District, C.Q.

Photo. by R. Harding.]

PLATE 7.—ALLUVIAL FLATS ON BELL'S CREEK, CALLIDE VALLEY—Inspection by the British Cotton Delegation.

Photo. by R. Harding.]

PLATE 8.—THE COTTON DELEGATION AT STAFF-SURVEYOR SUTER'S CAMP, BELL'S CREEK, CALLIDE VALLEY.

Left to Right: Mr. Crompton Wood, Mr. Crawford Vaughan, Mr. R. Harding, Mrs. Suter, Mr. Harold Parker.

Photo. by R. Harding.]

PLATE 9.—LENDING A HAND, WOWAN, DAWSON VALLEY.

Photo. by R. Harding.]

PLATE 10.—ON THE ROAD FROM KINGAROY TO BELL—SCRUB SCENE NEAR PORTER'S GAP, BUNYA MOUNTAINS.

Photo. by R. Harding.]

PLATE 11.—THE DELEGATION AT WORK, CALLIDE VALLEY.

Photo. by R. Harding.,

PLATE 12.—IN TRACKLESS LANDS. SCENE ON UPPER CALLIDE.

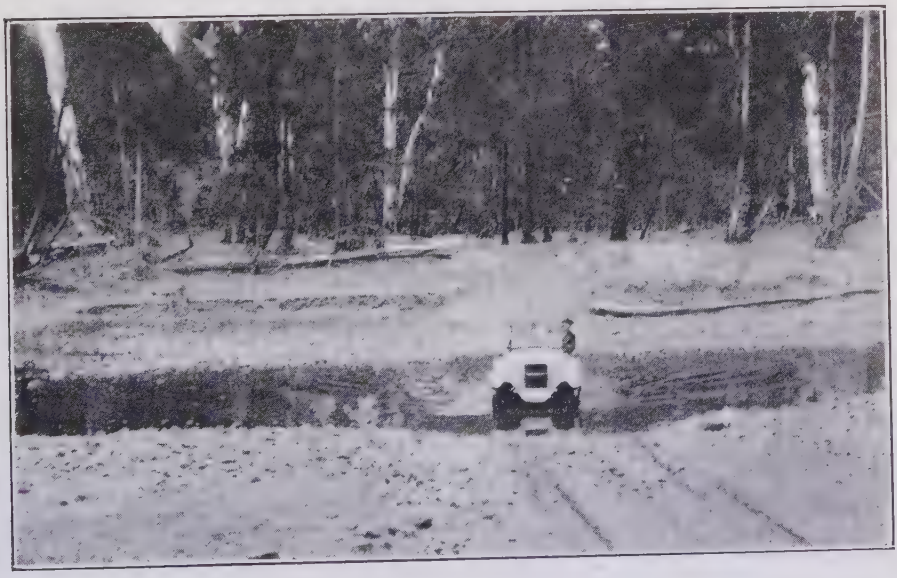


Photo. by R. Harding.]

PLATE 13.—A DON RIVER CROSSING, DAWSON VALLEY.

Photo. by R. Harding.]

PLATE 14.—AN EASY CROSSING. VIRGIN CALLIDE COUNTRY.

Photo. by R. Harding.]

PLATE 15.—A GLIMPSE OF THE CALLIDE VALLEY FLATS—KING COTTON'S UNFURROWED REALM.

Photo. by R. Harding.]

PLATE 16.—A SANDY PATCH EN ROUTE FROM BELL'S CREEK TO THE CALLIDE.

Photo. by R. Harding.]

PLATE 17.—COTTON DELEGATION INSPECTING SHIPPING FACILITIES, GLADSTONE JETTY.

Photo. by R. Harding.]

PLATE 18.—A PIONEER'S CLEARING NEAR PORTER'S GAP, BUNYA MOUNTAINS.

PLATE 19.—EXTENDING KING COTTON'S REALM—A PRELIMINARY SKIRMISH.

PLATE 20.—A TINGOORA HERD OF FRIESIANS. Scene on Ryfield, Mr. P. P. Fall's Farm.

Photo. by R. Harding.]

PLATE 21.—ON GUM AND APPLE PASTURES. A Homestead Outlook, "Marshlands," Wondai.

BANANA BUNCHY TOP DISEASE.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available a report of investigations of the Bunchy Top disease of bananas made conjointly by Dr Darnell Smith (Vegetable Pathologist of the New South Wales Department of Agriculture) and Mr. Henry Tryon (Vegetable Pathologist and Government Entomologist, Queensland). The disease has spread across the border into the south-eastern corner of this State and is causing much loss to growers and concern to departmental officers. Both officers visited the affected border areas and studied the malady from every angle and noted local remedial measures and experiments. Notwithstanding close observations and the knowledge of affecting facts no definite exclusive cause of the disease was discovered. Further, they concluded that the explanations with reference to its origination in the individual plant, put forward without—as far as could be ascertained—positive experimental evidence of a conclusive nature had not advanced their knowledge of the subject. However, the New South Wales investigations and especially its field experiments directed to definite phases of the question, would, as far as they had proceeded, appear to have narrowed the inquiry materially; suggesting, as they did, that certain theories put forward to explain the incidence and mode of action of banana bunchy top had now to be dismissed as untenable.—Ed..

Theories relating to the following possible agencies in promoting plant sickness were investigated:—

1. Soil Depletion, by the Loss—to Some Extent Absence—of Essential Banana Plant Food Constituents in it.

Fertiliser field experiments have rendered it evident that the use of complete fertilisers of varying constitution, as well as fertilisers providing a single essential plant food requirement, do not prevent the occurrence of the disease, either in soils relatively rich or in ones relatively poor, as ordinarily understood.

[NOTE.—These experiments, which have been conducted on proper lines, have, however, not so far related to humus-producing fertilisers nor covered the entire range of soil-types.]

2. Loss of Vigour in Banana Plants—e.g., by the Continuous Use of Banana Plants of a Single Origin.

Although the general habit of the plants in which the disease may manifest itself, including such plants as receive fertilisers as a field routine procedure, and although the high quality of the banana fruit that the district generally yields, would appear to be conclusive as to the "strain" of plants generally grown not having developed weakness, and so disease, this factor—hypothetical impairment of stamina—has not been lost sight of. It has now been shown experimentally to be non-operative by the manifestation of the Bunchy Top disease in plants introduced into the affected area from remote districts in which there has been no history of the occurrence of the malady, equally with those of local origin. One of these experiments, in which banana corms were obtained from north of Cairns, Queensland, covered no less than ten distinct field plots in the Tweed District.

3. Soil Acidity.

The factor of soil acidity, which might be presumed to operate in promoting the occurrence of disease, has been the object of test experiments with so far negative results. Ant-acids applied to the soil, whether in the form of lime or basic phosphates, having failed to protect plants from the disease occurrence—even ones introduced from "clean areas."

4. Soil Contagion.

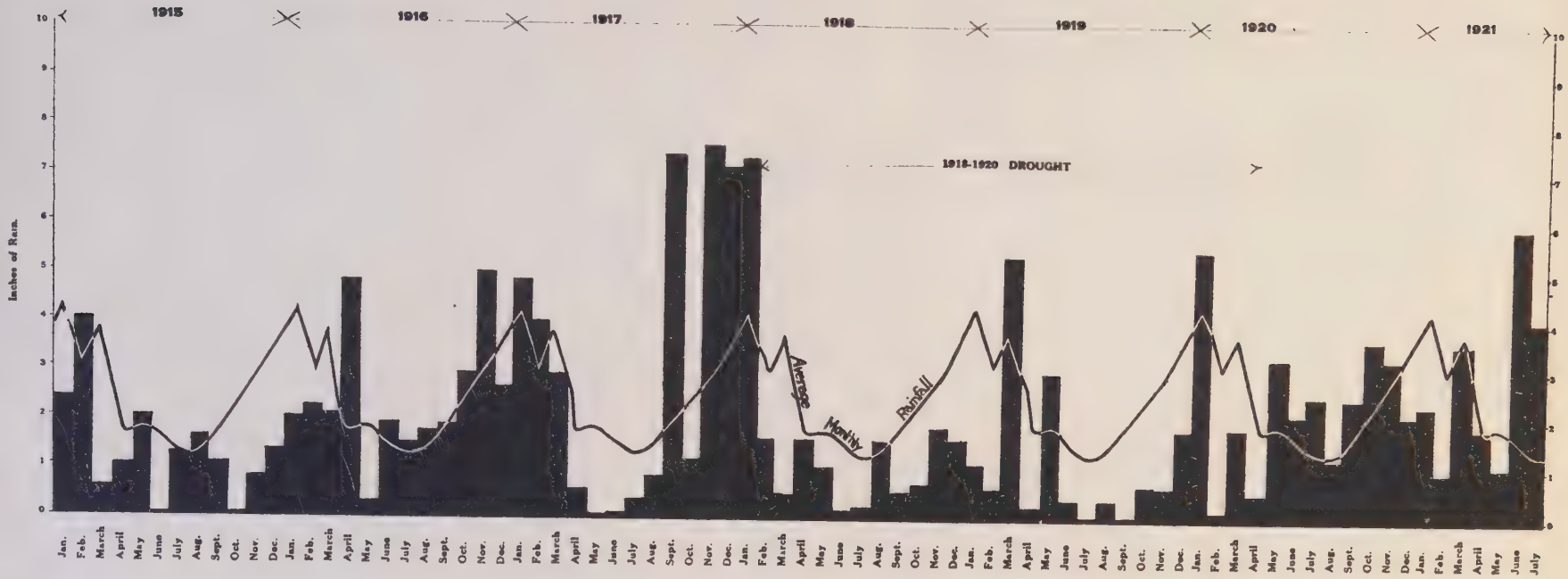
Field experiments have again shown that the disinfection—by one or other fungicides—of suckers in planting, and simultaneously that of the soil with which they are brought in contact, does not prevent the occurrence of the disease in plants derived from such suckers.

5. Definite Parasite Action.

Again, investigations have so far failed to reveal the presence of a fungus-organism or of fungus-organisms capable of originating Bunchy Top under experimental conditions, although certain ones, included in groups in which undoubted plant parasites occur, have been met with by one of us. (The inquiry, however, is still in progress.)

RAINFALL CHART.

QUEENSLAND AGRICULTURAL COLLEGE



6. Animal Parasites.

A nematode causing plant injury that we have commonly found in connection with the roots of Bunchy Top affected plants, not being invariably found to occur in this association, cannot be the exclusive cause of the malady. That any insect is inculpated has not been shown definitely to be the case.

[NOTE.—Some notoriety has attached to the pronouncement that a particular insect—the Banana Aphis (*Pentalonia nervosa*)—serves as the communicator of the disease between one plant and another, or even is its prime cause in healthy plants, and although general observations do not favour the explanation a remedy involving this insect theory is being tested in the New South Wales portion of the infected area.]

7. Climatic Factors.

The prejudicial effects of meteorological conditions unfavourable to the growth of the banana plant, those only gradually manifested in the course of years, cannot be settled by direct experiment. It appears, however, to be interdicted by what is known regarding the geographical range of the Cavendish and of other banana varieties, not only in the Tweed area but elsewhere. In regard to the former, there is evidence that in the past an abundant yield of good fruit has been raised from healthy plants for eight or ten successive years.

8. Climatically Injured Soil Conditions.

No evidence as to the nature of the change spontaneously produced in the soil under banana crops, since its adaptation from its original condition as a scrub or forest soil to this cultural use was obtained. This is a matter amongst others that it is proposed to be inquired into.

9. Prevention and Cure.

Both these are dependent on a knowledge of the cause of Bunchy Top disease or must have relation therewith. Not knowing the cause they cannot be predicted, and moreover we have not sought to discover them by empirical procedures conducted in this respect in the dark.

10. Further Research.

Further scientific inquiry on the cause, prevention, and cure of Bunchy Top disease is still called for. This inquiry should embrace both field and laboratory experiments and research. The bestowal of the fullest measure of scientific thought and endeavour in respect to the disease is urgently necessary.

ORANGE SUCKING BUGS.

By A. H. BENSON, M.R.A.C.

Two kinds of sucking bugs—viz., the Bronze Orange Bug (*Oncoscelis Sulciventris*) and the green or Spiny Orange Bug (*Biporulus bibax*)—both of which are native insects confined to Queensland and the northern coast districts of New South Wales, have been well known to orchardists for many years on account of their abominable odour and the damage they cause to citrus orchards, both to the fruit and the young tender shoots.

For a long time these insects were not looked upon as a very serious menace, as they were seldom met with in very large numbers, being evidently kept in check by natural agencies; but during the past three or four years their numbers have increased enormously, until during the present season a gallon or more bugs have been taken from a single tree in one day, and serious loss has been experienced by growers owing to the large quantity of fruit that has been destroyed, to say nothing of the young growth that has been killed.

In order to determine the best method of dealing with these pests it is necessary to possess a thorough knowledge of their life-history and habits. Fortunately these are and have been well known for many years, but unfortunately this knowledge has not been taken advantage of as it should have been. As already stated, both of these sucking bugs are native insects which, prior to the introduction of cultivated varieties of citrus fruit, fed on our native species of citrus—which were common in our coastal scrubs, but are now much less numerous—as well as on other native plants belonging to the same natural order "*Rutaceæ.*"

These native citrus and other plants belonging to the same natural order still provide a breeding ground from which the fully developed bugs can fly to cultivated orchards, and it is possible that they may have been the source from which a large number of the fully developed bugs that have been met with recently in the orchards have been derived. From the information submitted by growers, there has apparently been a regular influx of mature bugs from an outside source in the case of orchards where the bugs have been regularly and systematically gathered and destroyed, and which could not therefore have been bred in the orchard.

Life History.—

The life history of the bug is briefly as follows:—

The mature female bug deposits her eggs in clusters of about ten or a dozen on the leaves of citrus trees or other host plants. These eggs are about the size of a No. 5 shot—white in colour and possessing a pearly lustre. The shell of the egg is hard and not easily acted upon by any spraying material, so that it cannot be destroyed by spraying.

In a few days the young bugs hatch out from the egg clusters, the exact time depending on weather conditions. When they hatch out they remain clustered together for some time, and finally distribute themselves over the tree.

From the time they hatch out from the egg till they become fully mature insects (a period of a month or longer, according to local conditions), the young bugs are unable to fly. They, however, undergo several moults and change their colour first to a yellow, then to a red, and finally to a dark bronze-green in the case of the Bronze Orange Bug, and first to a yellow then to a green, and finally to the dark green of the fully matured Green or Spiny Orange Bug.

As soon as the young bugs leave the cluster in which they remained for a time after they had hatched out, they start in search of food, which they obtain by sucking from the stem or skin of the fruit or from young tender succulent growths, using their rostrum or sucking trunk, with which they easily pierce the skin or soft bark for this purpose.

Methods of Destruction.—

It will thus be seen that there is very little chance of poisoning their food, as, so far, there is no known method of poisoning the sap of a tree so that the insects feeding thereon by suction may be destroyed. Other methods of destruction must therefore be employed, and they consist of the following:—

First.—Get rid of all sources of infection, such as native citrus or other plants harbouring and breeding the bugs, isolated trees of cultivated varieties of citrus fruits that have been allowed to run wild, and all citrus trees in neglected or abandoned orchards.

Second.—Gather and destroy every mature bug, partly developed bug, egg cluster, or cluster of young bugs, early in the season. This work should start in July and be systematically followed up by *every grower of citrus trees.* If this is done, there will be very little, if any, loss.

Third.—As the young bugs are easily killed by means of oil or caustic sprays, these should be used regularly before the insects become fully developed, when their body is so well protected by the wing covers and hard covering that sprays have little effect on them.

Fourth.—As the bugs, both immature and fully developed insects, are always sluggish at daybreak, they can be easily shaken on to a cloth or sheet placed under the tree, or they will run to the centre of the tree from which, if it has been properly pruned, they can easily be brushed off on to the sheet. Tapping the outside of the tree with a padded stick is better than shaking the tree. The success of this method depends on the work being *carried out the first thing at daybreak,* for when the sun is well up the mature insects fly as soon as disturbed, and the immature bugs will hang on to the tree and not fall.

Fifth.—Hand gathering the eggs and the bugs, in all stages, whenever seen.

Sixth.—Cyaniding destroys many bugs in all stages, but is too costly to use for this purpose solely.

Seventh.—Deal with the bugs promptly; do not delay action because only a few are to be seen, but stamp them out before they have time to breed.

Prompt Action Necessary.—

Prompt and combined action is the secret of success in dealing with pests of this nature, and the neglect to take such action is largely, if not entirely, the cause of the present infestation, as the large number of bugs did not all breed at once, but are the progeny of many different hatchings.

Pests of this nature and others, such as locusts and caterpillars that destroy grass, grain, or hay crops, can be kept in check if dealt with as soon as they make their appearance, and the damage they cause will be reduced to a minimum by prompt and concerted action, without which no remedies are effectual and serious losses are bound to occur.

The question of dealing effectually with sucking bugs is therefore in the hands of our citrus growers, and now that they are well organised there should be little difficulty in bringing about concerted action for the destruction of this pest or of forcing careless persons who are simply breeding the pest to take the necessary steps for its destruction.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING NOVEMBER 1922 AND 1921 FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of Years' Records.	Nov., 1922.	Nov., 1921.
North Coast.				
	In.		In.	In.
Atherton	2·05	21	0 29	Nil
Cairns	4 13	40	0·10	2·80
Cardwell	4·13	50	1·65	0·42
Cooktown	2·76	46	0·60	0 80
Herberton	2·36	35	1·16	0·10
Ingham	3·84	30	0·46	0·54
Innisfail	6 35	41	1·93	0·89
Mossman	4 52	14	0·60	1·12
Townsville	1·84	51	0·21	0·01
Central Coast.				
Ayr	1·75	35	2·82	0·14
Bowen	1 31	51	0·27	Nil
Charters Towers ...	1·58	40	0 10	Nil
Mackay	2·91	51	1 56	1 46
Proserpine	3 02	19	0·56	0·94
St. Lawrence ...	2·34	51	0·72	0·53
South Coast.				
Biggenden	2·70	23	1·77	2·42
Bundaberg	2·60	39	0·17	1 68
Brisbane	3 69	71	3·53	3·24
Childers	2 81	27	1·89	3 24
Crohamhurst ..	4 39	30	3·86	2·76
Esk	3·13	35	3·27	1·53
Gayndah	2 80	51	2·56	1·38
Gympie	3 16	52	2 46	3·01
Glasshouse Mts. ...	3 74	14	1·24	3·48
Kilkivan	2 58	43	2·22	2 96
Maryborough ...	3 11	51	1·55	3·32

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of Years' Records.	Nov., 1922.	Nov., 1921.
South Coast—continued:	In.		In.	In.
Nambour	3·85	26	1·46	3 98
Nanango	2·57	40	2·25	1·09
Rockhampton ...	2·17	35	2·21	1 93
Woodford	3·20	35	2·50	3·56
Darling Downs.				
Dalby	2·66	52	0·62	1·74
Emu Vale... ...	2·57	26	3·78	2·06
Jimbour	2·36	34	0·49	1·79
Miles	2·49	37	0·29	1·14
Stanthorpe ...	2·70	49	3·32	2·24
Toowoomba ...	3·26	50	1·81	1·34
Warwick	2·51	57	4·80	3 36
Maranoa.				
Roma	2 05	48	0·26	1·12
State Farms, &c.				
Bungeworgorai ...	1·96	8	1·09	1 77
Gatton College ...	2 60	23	2·71	0·48
Gindie	2 03	23	2·28	0·05
Hermitage ...	2 61	16	2·99	2·81
Kairi	2·14	8	0·29	0 07
Sugar Experiment Station, Mackay	2·62	25	1·74	1·32
Warren	3·42	8	2·09	4·30

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for November this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE C. BOND,
State Meteorologist.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, DECEMBER, 1922.

The weather throughout the month was very hot, and gave the competition birds a trying time. The outlying feature of the laying among the light breeds was a fine score of 155 eggs laid by N. A. Singer's pen, his B. bird laying the possible, 31 eggs. C. H. Singer's pen came second with 151 eggs. In the heavy breeds Mr. R. Burns came first with 137 eggs. There were several cases of moult, all among birds which had just left the broody coops. Broodiness has again been troublesome, and accounts for small scores among the heavy breeds. One bird died during the month, the cause of death being apoplexy. The following are the individual scores:—

Competitors.	Breed.	Dec.	Total.
LIGHT BREEDS.			
*N. A. Singer	White Leghorns	155	1,230
C. H. Singer	Do.	151	1,188
*W. and G. W. Hindes	Do.	132	1,104
*Bathurst Poultry Farm	Do.	135	1,046
*S. L. Grenier	Do.	133	998
*R. Gill	Do.	126	997
*G. Trapp	Do.	127	994
*W. Becker	Do.	135	984
*J. M. Manson	Do.	127	982
*W. A. Wilson	Do.	124	981
*Mrs. L. Andersen	Do.	116	977
*H. P. Clarke	Do.	127	967
*J. W. Newton	Do.	126	953
*T. Fanning	Do.	92	943
J. H. Jones	Do.	83	938
*G. Williams	Do.	124	926
*C. Goos	Do.	120	920
A. G. C. Wenck	Do.	84	916
*R. C. Cole	Do.	105	913
*Oakleigh Poultry Farm	Do.	105	905
*O. Goos	Do.	106	900
*R. C. J. Turner	Do.	131	896
*Mrs. R. E. Hodge	Do.	111	890
*H. Fraser	Do.	97	875
*F. Birchall	Do.	130	867
*M. F. Newberry	Do.	93	859
*J. W. Short	Do.	115	859
N. J. Nairn	Do.	122	857
*Mrs. E. White	Do.	104	843
B. Hawkins	Do.	98	843
*Thos. Taylor	Do.	108	833
*C. M. Pickering	Do.	92	833
J. Purnell	Do.	82	822
T. H. Craig	Do.	96	813
A. Maslin	Do.	107	806
*E. A. Smith	Do.	118	792
G. F. Richardson	Do.	89	766
B. C. Bartlem	Do.	93	756
E. Stephenson	Do.	72	747
E. Symons	Do.	69	735
H. Trappett	Brown Leghorns	100	719
Brampton Poultry Farm	White Leghorns	102	705
A. Anders	Do.	70	701
Parisian Poultry Farm	Brown Leghorns	58	469

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Dec.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	137	1,100
*A. E. Walters	Do.	103	991
*T. Hindley	Do.	90	944
*C. C. Dennis	Do.	103	908
*R. Holmes	Do.	86	894
*E. F. Dennis	Do.	101	870
Mrs. A. Kent	Do.	88	868
Jas. Hutton	Do.	89	862
*H. M. Chaille	Do.	71	861
Mrs. A. E. Gallagher	Do.	100	841
R. Innes	Do.	90	800
*Jas. Potter	Do.	93	790
H. B. Stephens	Do.	88	776
Mrs. L. Maund	Do.	86	775
W. Becker	Chinese Langshans ...	77	749
*Rev. A. McAllister	Black Orpingtons ...	79	737
Wambo Poultry Farm	Do.	79	736
C. Doan	Do.	100	735
V. J. Rye	Do.	85	729
*Parisian Poultry Farm	Do.	83	728
Jas. Hitchcock	Do.	64	706
C. Rosenthal	Do.	91	660
W. C. Trapp	Do.	94	618
R. Burns	Silver-laced Wyandottes	74	589
*J. E. Smith	Plymouth Rocks ...	70	531
Miss L. Hart	Rhode Island Reds ...	54	413
Total	...	7,068	59,289

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total
LIGHT BREEDS.							
N. A. Singer	181	231	191	212	200	215	1,230
W. and G. W. Hindes .. .	187	179	189	179	194	176	1,194
Bathurst Poultry Farm	145	158	188	182	202	171	1,046
S. L. Grenier	161	134	172	173	177	181	998
R. Gill	183	178	186	169	128	153	997
Geo Trapp	176	157	168	180	148	165	994
W. Becker	161	137	174	160	170	182	984
J. M Manson	167	145	170	151	184	165	982
W. A. Wilson	167	152	139	176	168	179	981
Mrs. L. Andersen	185	138	172	160	164	158	977
H P. Clarke	161	149	166	176	155	160	967
J. W. Newton	170	164	182	144	167	126	953
T. Fanning	123	166	175	159	198	122	943
G. Williams	148	157	175	158	152	136	926
C. Goos	119	138	148	166	194	155	920
R. C. Cole	179	140	171	124	147	152	913
Oakleigh Poultry Farm	167	142	160	140	142	154	905
O. Goos	153	127	164	172	157	127	900
R. C. J. Turner	162	138	165	155	156	120	896
Mrs. R. Hodge	180	118	149	135	181	127	890
H. Fraser	147	165	148	130	130	155	875

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—*continued*							
F. Birchall	149	166	117	99	177	159	867
M. F. Newberry	147	125	118	177	134	158	859
J. W. Short	149	144	154	129	131	152	859
Mrs. E. White	157	77	172	116	152	169	843
Thos. Taylor	151	120	150	141	140	131	833
C. M. Pickering	167	163	107	136	141	119	833
E. A. Smith	125	126	143	143	125	130	792
HEAVY BREEDS.							
R. Burns	176	182	171	200	182	189	1,100
A. E. Walters	159	146	134	165	201	186	991
T. Hindley	137	156	109	201	204	137	944
C. C. Dennis	150	164	163	132	157	142	908
R. Holmes	118	175	156	145	142	158	894
E. F. Dennis	132	148	174	79	160	177	870
H. M. Chaille	152	152	165	130	159	103	861
J. Potter	135	137	132	139	143	104	790
Rev A. McAllister	133	141	151	91	65	156	737
Parisian Poultry Farm	88	122	145	91	138	144	728
J. E. Smith	65	108	79	71	92	116	531
Miss L. Hart..	80	94	63	87	45	74	443

CUTHBERT POTTS, Principal.

"THE FERTILISERS ACT OF 1914" AND "THE FERTILISERS ACT AMENDMENT ACT OF 1916."

The attention of storekeepers, manufacturers, or other vendors of fertilisers is directed to the provisions of the Fertilisers Acts and Regulations set out hereunder.

Dealers' Licenses.

No person may sell any fertiliser unless he is licensed as a dealer under the Act. Any person who desires to become licensed as a dealer must apply in writing to the Minister for Agriculture, in the form prescribed by Schedule I., and remit therewith the prescribed fee of one guinea.

The license issued in the form of Schedule II. of the Act remains in force until the thirty-first day of December of the year in which it is issued. It may be renewed annually on payment of the prescribed fee of one guinea.

Certificate of Registration of Fertiliser.

On or before the thirty-first day of January in each year every licensed dealer must deliver to the Under Secretary, Department of Agriculture, Brisbane, a certificate in the form of the Third Schedule of the Act, setting out the specified ingredients of each brand of fertiliser sold by him. A copy of Schedule III. is enclosed.

Upon the sale of any fertiliser, whether paid for at the time or not, the dealer must at the time of sale, or before delivery of the same or any part thereof, give to the buyer an invoice certificate, in the form of Schedule IV., or to like effect, signed by the seller or his agents, and containing the particulars prescribed.

Invoice Certificate.

The invoice certificate should be in the following form:—

SCHEDULE IV.

"The Fertilisers Acts of 1914-1916."

INVOICE CERTIFICATE.

I [*here insert name and address of licensed dealer*], in the State of Queensland, licensed dealer under the "*Fertilisers Acts of* 1914-1916," hereby certify that the fertiliser this day sold (consigned or forwarded, or as the case may be) by me to [*here insert name and address of buyer*], being a quantity of tons cwt. qr. lb., is known as [*here insert name of fertiliser*], and is marked with the figure, or trade mark, or sign following, that is to say [*here insert trade mark or sign on bag*].

And I also certify that such fertiliser contains the following ingredients, in the proportion of the whole, set opposite thereto, in the form hereunder:—

Nitrogen, per centum, as nitrate.*
Nitrogen, per centum, as ammonium sulphate.
Nitrogen, per centum, as blood.
Nitrogen, per centum, as flesh and offal.
Nitrogen, per centum, as bone nitrogen.
Nitrogen, per centum, unspecified.
Phosphoric Acid, per centum, as water soluble phosphoric acid.
Phosphoric Acid, per centum, as citrate soluble phosphoric acid.
Phosphoric Acid, per centum, as citrate insoluble phosphoric acid.
Phosphoric Acid, per centum, total phosphoric acid.
Potash, per centum, as potassium sulphate.
Potash, per centum, as potassium chloride.
Potash, per centum, insoluble and unspecified.
Fine material, per centum.†
Coarse material, per centum.†

In the case of excrement of animals or any natural substance or natural product which is used for fertilising the soil, or supplying nutriments to plants, other than stable manure, seaweed, or crude nightsoil, the average analysis is as under:—

Nitrogen, per centum. Phosphoric acid, per centum. Potash, per centum.

In the case of lime for fertilising purposes:—

(*a*) Caustic lime, or burnt lime, or quick lime—
Calcium oxide (CaO), per centum.

(*b*) Mild lime, or air-slaked lime‡—
Hydrate of lime ($Ca(OH)_2$), per centum.
Lime carbonate ($CaCO_3$) per centum.

(*c*) Agricultural lime‡—
Lime carbonate ($CaCO_3$), per centum.

(*d*) Gypsum‡—
Lime sulphate ($CaSO_4$), per centum.
Fine material, per centum.‡
Coarse material, per centum.‡

In the case of ashes, or wood ashes:—

Potash, per centum. Phosphoric acid, per centum. Lime (CaO), per centum.

Dated at , this day of , 192 .

[Signature of dealer or his agent.]

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* Here state whether in form of sodium, or potassium, or lime nitrate.

† In the case of bonedust and bonemeals, the percentage of fine and coarse material to be stated—fine to signify the particles smaller than one-fiftieth of an inch, and coarse larger than one-fiftieth of an inch.

In the case of basic slag, or Thomas phosphate, the percentage of fine and coarse material to be stated—fine to signify particles smaller than one-hundredth of an inch, and coarse larger than one-hundredth of an inch.

‡ In the case of air-slaked lime, agricultural lime, and gypsum, the percentage of fine and coarse material to be stated—fine to signify particles smaller than one-fortieth of an inch, and coarse larger than one-fortieth of an inch.

Printed Label to be attached to each Package.

Every dealer who sells (*see* definition of "Sale") any fertiliser must securely affix conspicuously to each package a *plainly printed label* clearly and truly certifying:—

(*a*) The number of net pounds of fertiliser in the package;

(*b*) The figure, trade mark, or other sign under which the fertiliser is sold;

(*c*) The chemical analysis, stating the percentage of nitrogen, phosphoric acid and potash, and the *forms* in which they respectively occur, and the percentage of fine and coarse material, etc., as required by Schedule III. and IV.

In the case of agricultural lime the percentage of coarse material and fine material must be stated on the label, together with the percentage of lime as CaO (calcium oxide) or $CaCO_3$ (lime carbonate); and in the case of gypsum the percentage of $CaSO_4$ (lime sulphate).

Sale.

"Sale" (with its derivatives) includes barter; also offering or attempting to sell, or manufacturing for sale, or importing or indenting, or receiving or introducing for sale, or having in possession for sale, or sending, consigning, forwarding, or delivering for sale, or causing or suffering or permitting or allowing to be sold or offered or exposed for sale.

Fertiliser.

A fertiliser is any substance or compound containing, in appreciable quantity, nitrogen, phosphoric acid, potash, or lime, manufactured, produced, or prepared in any manner for fertilising the soil or supplying nutriment to plants; also any excrement of animals or any natural substance, or natural product which is used for fertilising the soil or supplying nutriment to plants. The term does not include farmyard manure, stable manure, seaweed, or crude nightsoil, but any other crude product, or offal, whether specially treated or not, is a fertiliser within the meaning of the Acts if sold for the purposes of fertilising the soil.

Prices "Unit Value."

"Unit Value" means the cost of one per cent. by weight of the fertilising constituent in one ton of fertiliser. The unit values are fixed by the Commissioner of Prices, and give the maximum prices that may be charged by licensed dealers in fertilisers. The prices are based on registered analysis or certified actual analysis, provided that the containers are labelled as to analysis, etc., and the fertilisers invoiced in accordance with the Queensland Fertilisers Acts of 1914-1916.

All licensed dealers should make themselves fully acquainted with the unit values so fixed, and particular attention is directed to Prices Notification No. 386, which appeared in the *Government Gazette* of 7th October, 1922, in which will be found definitions of "fine," "coarse," "unspecified," etc.; also to Prices Notification No. 396 (*Government Gazette* of 4th November, 1922).

Dealers to Note.

It is to be noted that every person who intends to offer for sale, or sell, any fertiliser, must, before doing so—

Obtain a license from the Department of Agriculture;

Send a certificate of registration to the Department for each kind of fertiliser that it is proposed to sell;

Attach a printed label to each package, giving the required particulars; and

On a sale, give the buyer an invoice certificate as required by Schedule IV.

The invoice certificate given to the buyer, and the label attached to each package, must agree with the certificate of registration sent to the Department of Agriculture.

Forms of Registration (Schedule III.) or any other particulars, may be obtained from

THE UNDER SECRETARY,
Department of Agriculture and Stock,
Brisbane.

SHOW DATES FOR 1923.

Stanthorpe: 7th to 9th February.
Warwick: 13th, 14th, and 15th February.
Allora. 20th and 21st February.
Clifton: 28th February and 1st March.
Goombungee: 22nd March.
Herberton: 2nd and 3rd April.
Pittsworth: 4th April.
Chinchilla: 10th and 11th April.
Goondiwindi: 10th and 11th April.
Killarney: 11th and 12th April.
Esk: 11th and 12th April.
Toowoomba: 17th and 19th April.
Kingaroy: 26th and 27th April.
Maleny: 26th and 27th April.
Miriam Vale: 26th and 27th April.
Dalby: 2nd and 3rd May.
Toogoolawah: 3rd and 4th May.
Nanango: 3rd and 4th May.
Boonah: 9th and 10th May.
Wondai: 10th and 11th May.
Roma: 15th and 16th May.
Murgon: 17th and 18th May.
Wallumbilla: 22nd and 23rd May.
Ipswich: 23rd and 24th May.
Kilkivan. 23rd and 24th May.
Beaudesert. 29th and 30th May.
Marburg: 2nd to 4th June.
Mackay: 4th and 7th June.
Woombye: 20th and 21st June.
Lowood: 22nd and 23rd June.
Rockhampton: 21st to 23rd June.
Kilcoy: 28th and 29th June.
Woodford: 11th and 12th July.
Wellington Point: 14th July.
Caboolture: 19th and 20th July.
Mount Gravatt: 21st July.
Barcaldine: 24th and 25th July.
Rosewood: 25th and 26th July.
Pine Rivers: 27th and 28th July.
Sandgate: 3rd and 4th August.
Brisbane Royal National: 6th to 11th August.
Wynnum: 31st August and 1st September.
Zillmere: 8th September.
Laidley: 13th and 14th September.
Beenleigh: 20th and 21st September.
Kenilworth: 4th October.
Ascot: 24th October.
Pomona: 21st and 22nd November.
Millaa Millaa: 23rd and 24th November.

Event and Comment.

A Timely Defence of Australian Scientists.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has received the following memorandum from the Director of Fruit Culture (Mr. A. H. Benson, M.R.A.C.) in relation to the several paragraphs that have appeared in the Press commenting upon alleged inaction of the Department in relation to the investigation and prevention of diseases in fruit, and making comparison with the methods adopted in America, a country with a population of about 118,000,000:—

"Judging from the letters and paragraphs that appear from time to time in the public Press, one would be inclined to believe that the only part of the world in which anything is known regarding fruit and other pests is the United States of America, and that as far as Australia is concerned, there is no one competent to give advice on these matters. This is decidedly unfair to the many able men who have devoted years of study to these matters under Australian conditions, and who have met with many successes as well as certain failures.

"In these respects they compare more than favourably with their American confreres, as it does not seem to be known by the general public that diseases, such as the Pear Blight, Peach Rosette, Peach Yellows, Citrus Canker, the Boll Weevil of cotton, the Pink Boll Worm, to say nothing of the Gipsy Moth which has destroyed countless millions worth of timber, have been investigated not only by the scientists attached to the Department of Agriculture in Washington, but also by those employed by the several States of the Union. For many years past these scientists have worked without any appreciable results, as they are little further forward now with respect to the treatment of these pests than they were many years since, despite the fact that money in practically unlimited quantity has been available for carrying out the necessary research.

"Pear Blight and Peach Yellows have alone totally destroyed areas of fruit that would cover many times the whole area under fruit in Queensland. Of the Boll Weevil in cotton, the destruction caused by it is so immense that its effect has become one of world-wide discussion. Similar histories in varying degrees apply to the other diseases mentioned, to which several others might be added.

"If, therefore, success has not been achieved under such favourable conditions, it is certainly not fair to blame those in Australia who have been responsible for instructing agriculturists and horticulturists regarding the destruction of the various pests attacking their fields or orchards because they have failed to find absolute remedies for pests such as fruit flies, insects which the best brains in all parts of the world have hitherto failed to deal with effectively."

The Sunspot Minimum and Jensen's Theory.

Dr. Jensen's theory of the inter-relation between sunspots and terrestrial disburbances was commented on in the October "Journal's" reference to the solar eclipse. The recent phenomenon, it was stated, had clearly demonstrated that we were approaching a sunspot minimum, which in its turn raised the question whether the earth's climate and such phenomena as earthquakes, volcanic eruptions, and droughts were influenced or not by sunspot conditions. Since that article was published, the cables have informed us of an earthquake in Chili, which destroyed several towns, a tidal wave following the shock which rendered thousands homeless, whilst particulars came to hand only a few days ago of another terrestrial disturbance in Japan, which destroyed four villages in the vicinity of Nagasaki.—"Queensland Government Mining Journal."

The Meston Mangosteen—An American Inquiry.

To comply with a request from the United States Department of Agriculture an ascent of the Bellenden-Ker Ranges to obtain specimen plants from these high altitudes of the delicious Queensland fruit, Meston mangosteen, will be undertaken shortly by Messrs. C. T. White (Queensland Government Botanist) and E. W. Bick (Curator of the Botanic Gardens). The United States Department desires the specimens, in fact both seeds and plants, in order to try the fruit out in the various sub-tropical stations in Florida and Hawaii. The ordinary mangosteen can be grown almost anywhere, but the Meston variety is purely sub-tropical and has thrived in Java, Singapore, and in similar climates. The American experts anticipate that specimens obtained from the high altitudes of Northern Queensland will do well for hybridising purposes, or as a stock at the ordinary sub-tropical experimental stations.

Night Harvesting by Electric Light.

Officers of the Victorian Agricultural Department have expressed interest in the report of the farmer in the Albury district who successfully harvested a large portion of his crop at night by the aid of electric lights attached to the harvester.

Several considered that this was the forerunner of the general adoption of electricity for work in the field. The extension of the Morwell system to the country districts, they said, would do much to hasten the application of electricity to the work of the farm. There were many occasions, one officer observed, on which hasty gathering of the crop was essential if it was to be saved, and the possibility of working at night would mean the difference between success and failure. When heavy winds were imminent early harvesting would prevent loss from the grain "shaking out." With wheat as 5s. per bushel, this loss usually represented a considerable sum. Definite proof of the advantage to be expected from night harvesting was given at the Government farm at Werribee. Hay from experimental plots, which had been stooked in the field owing to the limitation of time for carting in was carried by the high winds on to the adjoining farm, and the sheaves were so intermixed that the manurial tests for oats were seriously affected.

Rural Credit—A South African Measure.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) is giving close consideration to the question of rural credit and is in touch with the South African Government regarding recent Union legislation on the subject. The full text of the South African Act is now to hand. It is entitled "An Act to provide for the formation, registration, and management of co-operative agricultural societies with unlimited liability, co-operative agricultural companies with limited liability, and co-operative trading societies with limited liability" and marks an important advance in rural finance. It provides for the formation of associations in conformity with the ideas set out in the title with the objects of (*a*) disposing of the agricultural products or livestock of members in the most profitable manner; and (*b*) manufacturing or treating the agricultural or livestock products of members and disposing of the products so manufactured or partly manufactured in the most profitable manner.

Other objects include the purchase and supply co-operatively of implements and all farming requisites; the manufacture or treatment of farming requisites, including manures; to purchase and to work on behalf of members implements and machinery; to purchase and control breeding stock; to carry on supply stores under the co-operative system; to provide for cold storage; to carry on crop, produce, or livestock insurance, orchard spraying or cleansing, fruit packing, ploughing, and other farming operations for members on a co-operative plan; to provide competent instruction and advice; to disseminate farming information; to disseminate information on the markets of the world, and on co-operation in general; to carry on banking and insurance business under a co-operative system; the formation of co-operative trading societies on a limited liability basis and similar societies on an unlimited liability basis.

A chapter of the Act sets out the liability of members and capital. The conditions of membership laid down for unlimited liability societies provide for all of its members to be jointly and severally liable for the payment of debts and obligations of the society. The liability of any member who resigns, dies, or is expelled ceases in respect of debts and obligations incurred after he ceases to be a member; and in all other respects as soon as the balance-sheet and profit and loss account of the society disclose a credit balance in favour of the society. No unlimited liability society formed under the Act is required to have any fixed capital. The funds necessary for the carrying on of the operations of such a society shall consist of (*a*) capital funds, including any loans raised by the society; and (*b*) revenue funds, including the reserve fund. No loan in excess of £100 shall be raised by any such society without the approval of at least two-thirds of the members present at a general meeting specially convened for the purpose, of which notice, stating full particulars, has been given and unless the board of directors has approved of the loan.

In many other respects the South African legislation is similar to enactments with the same objects of Canada, the United States, and New Zealand, and its provisions generally are worthy of the close study of all interested in the stabilisation of the agricultural industry.

Financing Farmers—New Zealand Legislation.

What may be described as a rural revolution is taking place to-day in most agricultural countries. Everywhere the importance of agriculture as a "key" industry is being realised by legislators and others concerned closely with agrarian affairs. The old methods of financing farmers have come under review and condemnation and now most progressive countries are devising means for meeting a demand for a more equitable system of rural credit. In Australia serious consideration is being given to several systems, and in this respect we have the advantage of the experience of European countries, the United States, and Canada, and now New Zealand. In Queensland particularly it is recognised that no scheme of rural organisation can be complete without some measure for placing rural credit on a more rational basis and all information that can possibly be obtained from countries in which various systems are operating is being gathered with a view to framing similar measures favourable to the Queensland farmer. New Zealand has passed recently a Rural Credit Associations Act to "make provision, by means of the establishment of rural credit associations, for affording financial assistance to farmers and rural workers," which will repay study.

The purpose of this Act is to afford statutory recognition to certain classes of societies established for the mutual benefit of their members, their primary object being the making of advances to their members, secured principally on chattel security. Under previous legislation—the Incorporated Societies Act—the registration and incorporation of a main or central society or association is permitted, and also the registration and incorporation of district or branch societies.

The Act provides that no association shall be registered unless its rules provide for the following matters:—The receipt of deposits, whether from members of the association or others; the payment of interest upon such deposits at rates fixed in accordance with the rules of the association; the authority to borrow additional moneys as may be required by the association; the lending of money (either in cash or by the issue of bonds charged on the assets of the association, and payable to bearer or to order) to members of the association for approved purposes and under fixed conditions; the carrying to a reserve fund of all profits arising from the operations of the association; the appointment of a management committee of the association and of a manager, who shall be the chairman of such committee.

Members of the association are made jointly and severally liable for the liabilities of the association. It is recognised that comparatively few members will be the owners of unencumbered land, and it is provided, therefore, that the liabilities constitute an equitable charge on the assets of the members, subject to encumbrances existing at the time of the incorporation of the society.

The purposes for which loans may be made to members are enumerated as follows:—The clearing, fencing, draining, and general improvement of land in the occupation of a member; the erection of buildings on any such land; the purchase of implements, stock, seed, plants, trees, and other things required in the occupation and use of land; the purchase of tools of trade; the payment of any mortgage, debt, or other liability of the member. Loans to any one member are limited to £500. Administration expenses are kept within bounds by a provision for the payment of one member only (secretary and treasurer), together with an annual allowance to the chairman of the management committee.

General Notes.

Pineapple Board Referendum.

In the course of the month a referendum was taken on the question of pooling the pineapple crop. A set of questions was submitted to all registered growers, with the result that a negative majority was recorded. Following are the details of voting:—

DETAILS OF VOTING.

District.	Question No. 1. Are you in favour of a Pineapple Board for all Pineapples?		Question No. 2. If not, are you in favour of a Board for Smooth Leaf Pineapples only?		Acreage on the All-Pineapple Pool.	
	Yes.	No.	Yes.	No.	Yes.	No.
Woombye District	30	126	37	122	170	644
Palmwoods District ..	48	34	42	37	201	163
Beerburrum District ..	166	48	135	44	882	214
Cleveland District	52	115	19	95	227	733
Brisbane and other Districts	33	62	12	34	140	300
	329	385	245	332	1,620	2,054

Tomato Pool Board.

Under the Primary Products Pools Act of 1922, tomatoes grown in the Stanthorpe district have been declared a commodity. A board consisting of the following members has been constituted in relation to it. The members are: Messrs. W. H. C. Laird, S. A. Mitchell, W. H. Passmore, M. E. Sewell, and A. E. Watts. Mr. W. H. Passmore has been appointed chairman of the board.

Instruction in Poultry Keeping.

The poultry instructor, Mr. John Beard, will be at Stanthorpe on 6th February, at Warwick on the 10th and again on the 17th, at Killarney on the 15th, at Allora on the 19th, at Toowoomba on the 22nd, and at Clifton on 27th February next. In the course of his stay in each centre Mr. Beard will endeavour to visit as many of the local poultry yards as possible, and he also hopes to give lectures on poultry breeding, such lectures to be free to the public.

Primary Products Pools Act—Issue of Regulations.

Regulations have been issued under the Primary Products Pools Act of 1922. These prescribe a form of application which is to be made when asking for an Order in Council for a pool. This application may be made by the Council of Agriculture, representative growers of the particular commodity concerned, or by an organisation representing growers of that commodity. The applicants, after asking for a commodity to be brought under the provisions of the Act and that a board be constituted for such commodity, must also specify the classes of persons who shall be deemed to be growers of the commodity; that is, they must define the class of persons who shall be entitled to vote in connection with the proposed board. For

instance, the definition may be in terms of the number of acres of the commodity grown by each person, or the number of fruit trees or animals he may have, as the case may be. A person who is not entitled to vote will not have his commodity handled by the proposed board. The application must also define the district or districts in which the board shall operate, and the number of members for the proposed board. The application may also include any other representations which it may be desired should be made to the Minister.

The regulations further provide for the taking of a referendum as to whether the pool asked for shall come into operation, and in the event of the referendum being in the affirmative, for the subsequent election of the board. In all voting by growers (which are corporations or in partnerships) each corporation or partnership shall have one vote only, and persons under the age of twenty-one years shall not be eligible to vote. The regulations also lay down the methods of procedure to be followed by boards at their meetings. Provision is made that a board must meet at least once a month, and that all questions dealt with at any meeting shall be decided by majority and by open voting. If a member refuses to vote his vote shall be counted for the negative. No member of a board shall vote in respect of any matter in which he has directly or indirectly any pecuniary interest, and every member who knowingly offends against this regulation shall be liable to a penalty not exceeding £100.

Power is given to the board to require every producer or authorised agent to supply the board with information respecting stocks of the commodity in question held at any time. Producers and agents must also furnish on demand any other information concerning contracts for sale, prices fixed by such contracts, and other matters relating thereto which the board may require for the purposes of administration.

Answers to Correspondents.

Worms in Chickens.

G.C.Y. (Elimbah)—

The Poultry Instructor, Mr. J. Beard, advises:—

1. All your young stock will be more or less infected with worms, the pale-looking ones being affected the most.

Treatment: Give 10 to 15 drops of oil of turpentine in a teaspoonful of warm castor oil, on an empty stomach; two hours afterwards give another teaspoonful of castor oil. The birds should be placed in a box with a wire bottom so that when they pass the worms the latter drop through and can be picked up and burned; otherwise the birds would devour them again. All food should be supplied in troughs, not on the ground.

Preventive: Add to each gallon of water 50 grains of sulphate of sodium and 10 grains of sulphate of iron. Keep up this treatment for two weeks.

2. This Department's poultry pamphlet is out of print, but a copy of the new edition will be forwarded to you as soon as same is received from the Government Printer.

Sudan Grass.

J.W.C. (Stanthorpe)—

The Director of Agriculture, Mr. H. Quodling, advises:—

A number of analyses have been carried out by the Agricultural Chemist to determine exactly at what stage sudan grass is poisonous. Up to the present it has been shown that the second growth of this plant apparently carried more of the poisonous principle. This fact has been borne out to some extent by the deaths of animals having access to young shoots which have sprung up after the first cutting of the plants. In one instance at Toowoomba the death of fourteen head of dairy cows occurred. Samples of the fodder were obtained and submitted to the Senior Analyst of this Department, who found one grain of hydrocyanic acid present per pound of green material. The conclusion formed after carrying out a large number of analytical tests is that sudan grass must be fed with caution—even the first growth—and that the safest time to feed is when the plant has come into head.

Less danger is to be anticipated when sudan grass is cut and allowed to wilt for, say, 36 hours before feeding out to stock.

Probably one of the safest remedies for sudan grass poisoning is copious drenches up to 3 or 4 quarts of molasses, but the affected animals must be treated promptly. The inference to be drawn from this fact is that when feeding green stuff of this or of a similar character, less danger is to be expected when molasses are mixed throughout the chaffed fodder.

Orchard Notes for February.

THE COAST DISTRICTS.

February in coastal Queensland is frequently a wet month, and, as the air is often heavy with moisture and very oppressive, plant growth of all kinds is rampant, and orchards and plantations are apt to get somewhat out of hand, as it is not always possible to keep weed growth in check by means of cultivation. At the same time, the excessive growth provides a large quantity of organic matter which, when it rots, tends to keep up the supply of humus in the soil, so that, although the property looks unkempt, the fruit-producing trees and plants are not suffering, and the land is eventually benefited. When the weed growth is excessive and there is a danger of the weeds seeding, it is a good plan to cut down the growth with a fern hook or brush scythe and allow it to remain on the ground and rot, as it will thereby prevent the soil from washing, and when the land is worked by horse power or chipped by hand it will be turned into the soil. This is about the most satisfactory way of dealing with excessive weed growth, especially in banana plantations, many of which are worked entirely by hand.

The main crop of smoothleaf pineapples will be ready for canning, and great care must be taken to see that the fruit is sent from the plantation to the cannery with the least possible delay and in the best possible condition. The only way in which the canners can build up a reputation for Queensland canned pineapples is for them to turn out nothing but a high-class article. To do this they must have good fruit, fresh, and in the best of condition.

The fruit should be about half-coloured, the flesh yellowish, not white, of good flavour, and the juice high in sugar content. Over-ripe fruit and under-ripe fruit are unfit for canning, as the former has lost its flavour and has become "winey," while the latter is deficient in colour, flavour, and sugar content.

For the 30 or 32 oz. can, fruit of not less than 5 in. in diameter is required, in order that the slices will fit the can, but smaller fruit, that must not be less than 4 in. or, better still, 4¼ in. in diameter, and cylindrical, not tapering, can be used for the 20-22 oz. can.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well filled and not partly developed. If the fruit is over ripe it will not carry well, and is apt to reach its destination in an unsaleable condition.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees that have recently been thinned out, and these must be removed. Where there are facilities for cyaniding, this is a good time to carry out the work, as fruit treated now will keep clean and free from scales till it is ready to market. Citrus trees can be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees, as they transplant well at this period of the year.

A few late grapes and mangoes will ripen during the month and, in respect to the latter, it is very important to see that no fly-infested fruit is allowed to lie on the ground, but that it is gathered regularly and destroyed. Unless this is done, there is every probability of the early citrus fruits being attacked by flies bred out from the infested mangoes.

Strawberries can be planted towards the end of the month, and, if early-ripening fruit is desired, care must be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be brought into a state of thorough tilth by being well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertiliser, as strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of peaches and plums, and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice given in these notes for the two previous months, with regard to handling, grading, packing, and marketing, is again emphasised, as it is very bad policy to go to all the trouble of growing fruit and then, when it is ready to market, not to put it up in a manner that will attract buyers.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market. Expenses connected with the marketing of fruit are now so high, owing to the increased cost of cases, freight, and selling charges, that it is folly to attempt to market rubbish.

During the early part of the month it will be necessary to keep a careful watch on the crop of late apples in order to see that they are not attacked by codlin moths. If there is the slightest indication of danger, a further spraying with arsenate of lead will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit-fly must also be systematically fought wherever and whenever found, and no infested fruit must be allowed to lie about on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least, before packing. This tends to tighten the hold of the individual berries on the stem and thus prevent their falling off.

In the western districts, winemaking will be in progress. Here, again, care is necessary, as the better the condition in which the fruit can be brought to the press the better the chance of producing a high-class wine.

Where necessary, citrus trees should be given a good irrigation, as this will carry on the fruit till maturity, provided it is followed up by systematic cultivation so as to retain a sufficient supply of moisture in the soil.

Farm Notes for February.

Reference was made in last month's Notes to the necessity for early preparation of the soil for winter cereals, and to the adoption of a system of thorough cultivation in order to retain moisture in the subsoil for the use of crops intended to be raised during the season. The importance of the subject, and its bearing in relation to prospective crop yields, is made the excuse for this reiteration.

The excellent rains recently experienced should have a heartening effect on all farming operations, as a good season may now be reasonably expected.

Special attention should be given to increasing the area under lucerne (broadleaf Hunter River), wherever this valuable crop will grow. Its permanent nature warrants the preparation of a thorough tilth and seed bed, and the cleansing of the land, prior to sowing the seed, of all foreign growths likely to interfere with the establishment and progress of the crop. Late in March or early in April is a seasonable period to make the first sowing, providing all things are favourable to a good germination of seed.

Dairymen would be well advised to practise the raising of a continuity of fodder crops to meet the natural periods of grass shortage, and to keep up supplies of succulent fodder to maintain their milch cows in a state of production. Weather conditions, particularly the recent heavy and continuous rains, have interfered a great deal with farming operations. Although abundant supplies of grasses are in evidence, provision should be made for the inevitable period, at maturity, when these lose their succulence.

Many summer and autumn growing crops can still be planted for fodder and ensilage purposes. February also marks an important period as far as winter fodder crops are concerned, as the first sowings of both skinless and cape barley may be made at the latter end of the month in cool districts. Quick-growing crops of the former description suitable for coastal districts and localities, where early frosts are not expected, are Soudan grass, Japanese and French millet, white panicum, liberty millet, and similar kinds belonging to the Setaria family. Catch crops of Japanese and liberty millet may also be sown early in the month in cooler parts of the State, but the risk of early frosts has to be taken.

Maize and sorghums can still be planted as fodder and ensilage crops in coastal districts. In both coastal and inland areas, where dependence is placed largely on a bulky crop for cutting and feeding to milch cows in May and June, attention should be given to Planters' friend (so-called Imphee) and to Orange cane. These crops require well-worked and manured land; the practice of broadcasting seed for sowing at this particular season encourages not only a fine stalk but a denseness of growth, which in itself is sufficient to counteract to some extent the effect of frost.

In the majority of agricultural districts where two distinct planting seasons prevail, the present month is an excellent time for putting in potatoes. This crop responds to good treatment, and best results are obtainable on soils which have been previously well prepared. The selection of good "seed" and its treatment against the possible presence of spores of fungoid diseases is imperative. For this purpose a solution of one pint of formalin (40 per cent. strength) to 24 gallons of water should be made up, and the potatoes immersed for one hour immediately prior to planting the tubers. Bags and containers of all kinds should also be treated, as an additional precaution. "Irish blight" has wrought havoc at times in some districts, and can only be checked by adopting preventive measures and spraying the crops soon after the plants appear above the ground. Full particulars on the preparation of suitable mixtures for this purpose are obtainable on application to the Department of Agriculture, Brisbane.

Weeds of all kinds, which started into life under the recent favourable growing conditions, should be kept in check amongst growing crops; otherwise yields are likely to be seriously discounted. The younger the weeds the easier they are to destroy. Maize and other "hoed" crops will benefit by systematic cultivation. Where they are advanced, and the root system well developed, the cultivation should be as shallow as possible consistent with the work of weed destruction.

First sowings may now be made of swede and other field turnips. Drilling is preferable to broadcasting, so as to admit of horse-hoe cultivation between the drills, and the thinning out of the plants to suitable distances to allow for unrestricted development. Turnips respond to the application of superphosphate; 2 cwt. per acre is a fair average quantity to use when applied direct to the drills.

Where pig-raising is practised, land should be well manured and put into good tilth in anticipation of sowing rape, swedes, mangels, field cabbage, and field peas during March, April, and May.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5·1	6·49	5·25	6·46	5·45	6·24
2	5·2	6·50	5·26	6·46	5·46	6·23
3	5·3	6·50	5·27	6·45	5·47	6·22
4	5·3	6·50	5·28	6·44	5·47	6·21
5	5·4	6·50	5·29	6·43	5·48	6·20
6	5·5	6·51	5·30	6·43	5·48	6·19
7	5·5	6·51	5·30	6·42	5·49	6·17
8	5·6	6·51	5·31	6·41	5·49	6·16
9	5·6	6·51	5·32	6·40	5·50	6·15
10	5·7	6·51	5·33	6·39	5·50	6·14
11	5·8	6·51	5·33	6·39	5·51	6·13
12	5·9	6·51	5·34	6·38	5·51	6·12
13	5·10	6·51	5·35	6·38	5·52	6·11
14	5·11	6·51	5·36	6·37	5·53	6·10
15	5·12	6·51	5·36	6·36	5·54	6·9
16	5·12	6·51	5·37	6·35	5·54	6·7
17	5·13	6·51	5·38	6·35	5·55	6·6
18	5·14	6·50	5·38	6·34	5·56	6·5
19	5·15	6·50	5·39	6·33	5·56	6·4
20	5·16	6·50	5·40	6·32	5·57	6·3
21	5·16	6·50	5·40	6·32	5·57	6·2
22	5·17	6·50	5·41	6·31	5·58	6·0
23	5·18	6·49	5·41	6·30	5·58	5·59
24	5·19	6·49	5·42	6·29	5·59	5·58
25	5·20	6·49	5·42	6·28	5·59	5·57
26	5·20	6·48	5·43	6·27	6·0	5·56
27	5·21	6·48	5·44	6·26	6·0	5·55
28	5·22	6·47	5·45	6·25	6·1	5·53
29	5·23	6·47	...	...	6·1	5·52
30	5·24	6·46	...	...	6·2	5·51
31	5·25	6·46	...	...	6·2	5·50

PHASES OF THE MOON, ECLIPSES, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

3 Jan.	○	Full Moon	12 33 p.m.
10 ,,	☽	Last Quarter	10 55 a.m.
17 ,,	●	New Moon	12 41 p.m.
25 ,,	☾	First Quarter	1 59 p.m.

Perigee on 8th at 9.54 p.m.
Apogee on 23rd at 11.24 p.m.

On 3rd January at 9 a.m. the Earth will be in perihelion, its least distance from the Sun about 91,300,000 miles. Three days later Venus will be in perihelion, and will be about 17,000,000 miles further from the Earth than it was on 25th November when in perigee.

On 29th January Mercury will be passing to the west of the Sun about 4 degrees on its northern side.

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2 Feb.	○	Full Moon	1 53 a.m.
8 ,,	☽	Last Quarter	7 16 p.m.
16 ,,	●	New Moon	5 7 a.m.
24 ,,	☾	First Quarter	10 6 a.m.

Perigee on 4th at 5.18 p.m.
Apogee on 20th at 6.18 p.m.

On 4th February Venus, apparently on the western border of Sagittarius, will be at its greatest western elongation, about 47 degrees from the Sun. On the 6th, soon after sunset, Saturn will be occulted by the Moon when below the horizon, but about four hours later the Moon, Saturn, and Spica will be apparently near to one another low down in the east.

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3 Mar.	○	Full Moon	1 24 p.m.
10 ,,	☽	Last Quarter	4 31 a.m.
17 ,,	●	New Moon	10 51 p.m
26 ,,	☾	First Quarter	2 42 a.m.

Perigee on 4th at 8.48 p.m.
Apogee on 20th at 6.24 a.m.

The Moon will be partly eclipsed on the afternoon of 3rd March, and there will be an annular eclipse of the Sun on the 17th, but neither will be visible in Australia.

Saturn will be occulted by the Moon about 2 a.m. on 6th March, when apparently near to the bright star Spica in the constellation Virgo. This fine combination of celestial objects will be then high up in the sky, nearly overhead.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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